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INDEX TO ADVERTISEMENTS.

121, 122, 123, 124

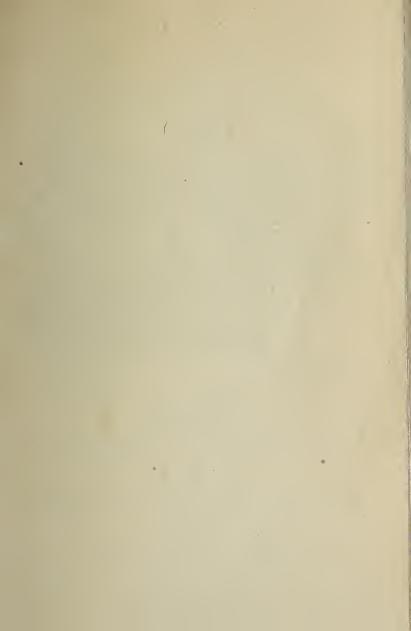
Acme Burnisher Co.

Air Brush Mfg. Co	86
Allen & Rowell	28
Anthony, E. & H. T., & Co101, 10	2 103 104 125
Anderson, J. A.	~, 100, 104, 120 31
American Amat. Photograper	112
American Camera Co	97
Archer & Sons	9 <i>1</i>
Artistic Photo Co	110
Ashe, W. F	135
D 1 1 0 D	4.0
Bachrach & Bro	43
Bausch & Lomb Optical Co	95
Bartholomew & Peckham	106
Barker & Starbird	
Barnett, J	140
Bates, W	71
Beasley, H. J.	30
Beverley, S	54, 55
Beresford, F	
Blair Camera CoOutside ba	ck cover page
Boardman, A. F., & Co	
Bradfisch, L	143
Britannia Works Co	37, 38, 39, 40
Broude, R. W., & Co	127
Buchanan, Bromley & Co.	1/1
Buchanan, Bromiey & Collision	
Carbutt, J	52
Chambers.	29
Collins, A. M., Mfg. Co.	
Codman, C. H., & Co	28
Cramer, G., Dry Plate Works	41
Crosscup & West Engraving Co	98
Crouch, H., La.	117
Cullen, W. C.	150
Dallmeyer, J. HInsid	e cover pages
Dall, J. H.	130
Day, E	99
De Saulles, S. & G., & Co	
De Baurles, D. & Co., & Contraction of the Contract	
	, i
	, i
Eastman & CoEdge, J	

Edwards3	3, 34, 35, 36
Eidsforth & Mudford	64
Electro Tint Engraving Co	115
Empire Photo Gravure Co	20
Elliott & Clymer Co	127
Epps	107
Forbes Litho Co	18
Fourdrinier, Hunt & Co	64
French, B. & Co	21
Fry, S. & Co	26
Gilbert, E. A. & Co	130
Gotz, J. R.	
Gray, R. D.	
Gossklaus & Ricksecker	46
Griffin, J. J., & Sons	17
Griffiths, W.	93
Gundlach Optical Co	
Gutekunst, F	
CHOCKERING I I I I I I I I I I I I I I I I I I	
Harvard Dry Plate Co	134
Harrison & Sons	
Heliotype Printing Co	47
Hicks, J. J.	19
Hovey Bros	9
Houghton, G., & Son	1/0
Howland & Chadwick.	127
Hughes, W. C.	72 70
Hyatt, H. A.	27
11yatt, 11. A	~1
Islington Printing and Enlarging Co	108
Ishington I throng and Emarging Co	
Jones, J. W.	107
Jones, J. W	101
Keene, R	99
Knox, A. A., & Co.	137
Kurtz, W	14
Law, Sons & Co	66
Lawrence, Chas	
Levytype Co	12, 13
Lewis Engraving Co	44
Liesegang, E London Stereoscopic and Photo Co	00 00
London Stereoscopic and Photo Co	100
London and Paris Optical and Clock Co.	128
Dr. C. III. M. II. Pr. Co.	01
McCollin, T. H., & Co	21
McDonnald, J. N.	43
Martin, G. S	
Martin, J	105

Mander, E., & Sons	94
Mersereau, W. T., & Co	139
Miller & Co	87
Moss Engraving Co	80
Mogey, W. & D	63
Moran, R. H.	100
Morrison, J. W	126
Morley & Cooper	108
Mullett Bros	13
Murphy, G	109
Myers, G. A	93
Nelson, Dale G., & Co	56
Newman	91
Obrig Camera Co.	8
Partridge, Sam. C	109
Park, H	94
Perken, Son & Rayment151, 152, 153, 154, 155,	156
Pearson & Denham	114
Phelps Enameling Co	66
Photo Engraving Co	113
Platinotype Co.	133
Platt, E. G.	105
Place, J	111
Prosch Mfg. Co	61
Pullman, E. J.	136
Randall & Co	92
Ramsperger, H. G., & Co	130
Rau, W. H	132
Rauch, W. W., & Co	108
Reynolds & Branson	116
Reifschneider, F	126
Richardson, W. P.	111
Roberts & Fellows	0, 11
Ross & Co	22
Rudonsky, C. A.	99
Sands & Hunter	53
Schneider, F. A.	46
Schwartz & Bro.	136
Schultze Photo Equipment Co	144
Scholzig, Otto	24
Scorer, W	91
Scott, Amy	148
Seavey, L. W. 57, 58, 5	9, 60
Shew, J. F., & Co	75
Skinner, J. H., & Co	120
Somerville, J. C.	128

St. Louis Photographer	141
Stendicke, R. A.	147
Sweet, Wallach & Co	46
Swift & Son	96
Talbot, R.	128
Thomas, S. A.	136
Thompson, A. T., & Co	42
Thornton-Pickard Mfg. Co	65
Thomas, R. W., & Co., Ld.	90
Tucker & Butts	142
Turcke, A	-137
Tyler, W	45
Tylar, N	56
Vevers118,	119
Wilson, G. W., & Co	45
Washburn, D. C.	14
Watson, W., & Sons	
Wanamaker, J	87
Walmsley, W. H., Ld.	25
Waterlow & Sons, Ld46	
Weustner New Eagle D. P. Works	85
White, O. C	
White & Sheldon	
Wheeler, G., & Co	107
Wilson Hood Cheyney Co.	22
Willis & Clements	
Wilson, E. L.	
Wolfe, M.	
Wood, J	
Wray, W), 51
Wratten & Wainwright	12







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PREFACE.

The third volume of the International Annual of An-THONY'S PHOTOGRAPHIC BULLETIN is now complete. When we look back over the month's during which it has been in preparation, we remember the many kind words of help and substantial aid that we have received from its band of contributors. From all parts of the world, almost from pole to pole, came words of cheer and wishes for success, in addition to the many valuable papers which are found in the pages of the present volume. It gives us great pleasure to feel that we are favored in bearing this banner of photography under which so many noble workers are enlisted to further the advancement of the photographic art. To this band our readers are indebted for a rich store of knowledge and information given with all the freedom and generosity that characterizes scientific workers. third volume of the International Annual stands second to no other similar publication in the value of the contributions it contains or in the acknowledged ability of the authors of the papers found in its pages. Workers in every rank of the art will find something here to interest them. The veteran can listen to other veterans, the practical man will find a number of papers that interest him, the business photographer will hear many problems discussed that affect his welfare, while the amateur and artist have spread before them a diversity of papers bearing on topics that they also are thinking about.

The illustrations are numerous and the number given without precedent in the annals of similar publications. They reflect faithfully the progress and beauty of the application of photography to illustrative purposes, and are a monument to the skill and patient industry of those who have developed the methods that give us such wonderful reproductions of the image caught by the camera.

As usual, our publishers have been generous, nay, almost lavish, in their endeavors to make the volume handsome, and the editors tender their sincere thanks for the same.

The editors desire to thank all who have helped them for the eneouraging manner in which this assistance came, not tardily, but a perfect flood of good things for them to present to the readers of the Annual. And to the willing aid of the many earnest workers in photography, rather than to those who have collected the material, the success of the third volume of the International Annual is due.

ARTHUR H. ELLIOTT,

New York, U.S.A.

W. JEROME HARRISON, Birmingham, England.

INDEX TO AUTHORS.

i	AGE
"ABE LIZZARD" ABNEY, CAPT. W. DE W	130
ABNEY, CAPT. W. DE W.	216
ADAMS, W. I. LINCOLN	133
ADCOCK, WILLIAM1,	135
"ALLEN. BILL"	- 3
ANGERER, C. APPLETON, J. M.	4
APPLETON, J. M.	261
"ARCHER. TALBOT"	-218
BACHRACH, D., Jr.	6
BACHRACH, D., JR. BACKELANDT, Dr. LEO	136
BAIN, ROBERT E. M	137
BALTIN PAHL	12
BARDWELL, JEX	13
BARDWELL, JEX BARNES, CATHERINE WEED.	19
BEACH, F. C	356
BEACH, J. P.	23
BEER, A. W.	356
BEESON, F. T.	220
BENNETT, R. A. R. 222,	266
BLACK, ALEXANDER.	27
BOLTON DR H CARRINGTON	29
ROTHAMLEY C H	224
BOW, R. H	30
BOYD, MARY SCOTT	31
BROWNE, REV. J. CARTER	34
CARRUTHERS, GEO. A.	267
CHAMBERLAIN. WM37.	226
CHANDLER, HORACE P	37
CHANNON, H. J. CLARK, Mrs. FITZGIBBON	39
CLARK, Mrs. FITZGIBBON	41
CLEMONS, J. R.	42
CLEMONS, J. R. CULVERHOUSE, EMILY.	362
CROWELL, E. H	44
CROWSE, J. W.	359
DAVENPORT, GEO. E. DAVEY, VERNON L.	46
DAVEY, VERNON L	55
"D. B." DE SILVA, ABRM. M.	368
DE SILVA, ABRM. M.	56
"D. M."	304
DOUGALL, W	365
DRESSER, A. R.	269
DUCHOCHOIS, P. C.	59
DUFFIELD, HARRY T.	60
DUNMORE, EDWARD	63

	AGE
E. F. W	369
EHRMANN, CHARLES.	65
FILLOTE A H	
ELLIOTT, Á. H "ENGLISH EDITOR"	100
"ENGLISH EDITOR"	
ERSLY, P.	67
ESTARBROOKE, E. M.	370
EVANS, FRED. II	273
EVERSHED, A. R. F.	
	375
FORREST, J. A. 68,	, 69
FRENCH, W. A.	377
FULLER, R. M.	380
GARRISÓN, DR. H. D.	71
	139
HAIMER, JOHN	227
HANSON, W.	75
HARDING, MARTIN J	277
HARRIS, CHARLES	77
HARRIS, I. H. E. I	79
HARRIS, J. T.	71
	382
HARRISON, G. E.	384
HARRISON, W. JEROME	278
HARVEY, J. H	386
HASTINGS, GEO. H.	142
HAYNES, GEO. A.	144
HACWELL TOUN	281
HASWELL, JOHN	
HEYL, J. B.	86
HICKMOTT, W. J	145
HICKMOTT, W. J. HIMES, Prof. CHARLES F	148
HIMLY, CAPT. EUGENE	72
HITCHCOCK, ROMYN	82
HOFFMANN, C. A	152
HOTDIN D T C	
HOLDEN, Prof. E. S.	153
HOPPS, FRANK	87
HOUGH, E. K	88
HUBERT, J	389
HURD, GUSTINE L	91
HUSNIK, J	74
THICKON T T	160
HUSSON, J. R	
JACKSON, F. A	161
JACOBY, Dr. R.	162
JACQUES, E. HOWARD	393
JANEWAY, Dr. J. H.	395
JOHNSON, J. F	168
IONES OHADMAN	$\frac{100}{229}$
JONES, CHAPMAN	229
KEENÉ, RICHARD	285
KENNAN, W. R.	93
KENNAN, W. R. KNAGGS, Dr. H. VALENTINE	170
LAMBERT, REV. F. C	290

	PAGE
LA MANNA, FRANK	_ 175
LANG W JR	288
LANG, W., Jr. LANIER, Prof. ALEXANDER.	01
LEAPER, CLEMENT I	- 01
IDEACEN, CLEMENT I	- 90
LEESON, ARTHUR J	_ 397
LEISK, J.	_ 292
LEVY. MAX	399
LEWIS, C. HETHTON	293
LINCOLN, REV. G. W	176
IOUGE Dr. O. W.	490
LOHSE, DR. O	~ %0% ~
LLOYD, REV. J. A.	- 297
LONDON, H	_ 231
LOOMIS, G. H), 301
LOVEJOY, E. J. MADDOX, Dr. R. L.	303
MADDOX DR R L	96
McKUNE, C. S.	180
MANSER, EDWARD	100
MANSER, EDWARD	9, 179
MANSFIÉLD, G	_ 306
MASON, GEORGE	- 309
MASON, O. G	_ 235
MATHESON, R. C.	237
MIETHE, Dr. Δ	100
MILES, DR. M	101
MIDGES, DR. M.	101
MITCHELL, G. G	- 102
MOISER, HENRY R	_ 309
MURRAY, A. S	_ 182
NELSON, G. A. NEWBURY, Prof. S. B.	_ 404
NEWBURY, Prof. S. B	239
NEWTON H I	2/12
NEWTON, H. J. NICOL, Dr. JOHN	400
ODED ATTRICUTATE TO	- 400
OBERNETTER, E	_ 246
PANCOAST, C. R.	_ 183
PARTRIDGE, W. E	_ 249
PARTRIDGE, W. E. PICKERING, Prof. W. H.	_ 252
PLATT HARRY	104
PLATT, HARRY POOLE, E	300
POTTER W H	955
POTTER, W. H. PRINGLE, ANDREW	911
PROGRAM ANDREW	- 311
PROCTOR, H. R.	- 314
RAFTER, G. W.	_ 318
READ, DANIEL P. REED, G. W.	_ 106
REED, G. W	_ 107
REED LIRIT H A	185
ROBERTS, NATHANIEL	408
DOODE TO	200
ROCHE, T. C. 258	, 520
ROCKWOOD, E. W	_ 110
ROCKWOOD, G. G. 410), 412
SAEMANN, BRUNO	_ 112
SANDS, HÁROLD	. 321
SCHUMANN. VICTOR	414

xiv

		GE
SCOTTON, THOMAS		114
SELLARS, Dr. COLEMAN 11		
SINCLAIR, Dr. G. L.	:	117
SKEEL, ADELAIDE	;	328
SMILLIE, THOS. W	:	191
SPAULDING, Prof. RANDALL		
STEBBINS, J. H., Jr.	;	333
STODDARD, S. R.		
SUPLEE, H. H.	:	195
SUTCLIFFE, F. M		
TALBOT, C. B.		
TAPLEY, W. J.	4	423 -
TASHIERA, GEORGE	;	337
TAYLOR, J. TRAILL		
TOLMAN, H. L.	4	427
"TRAMP"	:	120
TREAT, A. J.		202
VALENTINE, G. W		
VOGEL, Dr. H. W.]	128
VOLKMER, LIEUT. COL. O	5	212
WALL, E. J.	;	340
WALLACE, ELLERSLIE		
WALMSLEY, W. II	{	344
WARNER, HERBERT O	3	209 -
WARNER, W. HARDING.		
WATERHOUSE, Col. J.	4	430
WATSON, C. J	:	122
WATTS, WALTER A.	:	348
WEBBER, S. B.		
WHIPPLE, G. M.	:	354
WILLIAMS, H. H.		
WOLFE, M.		260

INDEX TO SUBJECTS.

I	AGE
Alpine Valley, An English	356
Amateurism, On	135
Amateur, The Chcerful	362
" " Ilbiquitous	201
" Photographer, Development of an	404
Amateurs, Advice to	303
" Photographer, Development of an Amateurs, Advice to. Amateur Photography, Past, Present and Future. "Educational Value of	242
" Educational Value of	193
" Work which Pavs	31
" Work which Pays American and Western Photographic Societies	480
Animals in Motion. Photographing	195
An Old Landmark	260
An Old Landmark Apprentice, The Photographer's	79
Art Side of Photography Some Thoughts on	306
Architecture, Notes on English Astronomical Photography at the Lick Observatory	69
Astronomical Photography at the Lick Observatory	153
Beginners, Some Things that Puzzle Blisters in Stripping Films, Negatives, ete	67
Blisters in Stripping Films, Negatives, etc.	355
Blue Printing for Amateurs	148
Bromide Papers	340
Bromide Papers '' Prints, Eikonogen for	96
California, Where to go with a Camera in Southern	337
Camping Photography	237
Can Photographs Lie?	427
Celluloid Films, How to Use Flexible	311
" Some Possible Uses of	430
Changing Bag, A Plea for the	77
Clouds, Printing in, a New Dodge	266
Collodion Emulsion, How I Develop, with Eikonogen	231
Collodion Process, A Neglected Dry Plate	288
Colored Screens and Color Sensitive Plates	82
Color Sens'tive Plates, Colored Screens and	82
" Ilow to Work with	246
Composite Photographs	249
Continental Photographie Societies	477
Copying Engravings from Books	99
"Hints on	142
Cracked Plate, A	39
Cycling and Photography	397
Daguerre, Monumenting	229
Daguerreotype Hawthorne on the	133
Daguerreotype, Hawthorne on the Dark Room, My Portable	168
"Spectroscopic Examination of Light Filters for_	372
Specificaçõe Danimation of Digit Privers for 2	0,0

	AGE
Detective Camera, The Future of	27
Developer, The One Solution	349
Developing in White Light	380
Development, A Few Notes on	56
" Dry Plate, for Beginners	137
" Fireside	277
Diaphragms, Interference	368
Double Fixing of Negatives	9
" Pose Photographs	152
Draper Memorial, Photography and the	115
Drop Shutter, A Simple	382
Dry Plates in a Damp Climate	375
vy hat is the matter vy hill (104
Educational Value of Amateur Photography	193
Eikonogen	59
Eikonogen as a Developer	370
Eikonogen as a Developer Control Developers, New Formulas for	72
" for Bromide Prints	96
" for Bromide Prints " How I Develop Collodion Emulsion with	231
" Its Constitution and Preparation	333
Electric Light in the Dark Room	-222
Engravings from Books, Copying	99
Enlarging, Landseape	386
Notes on	314
" or Reducing	1
Enlargements, Photographie, as Illustrations for Leetures	136
Exhibition Notes	290
" Preparing for an	202
Experiences, Some of My	46
Exposure, Praetical Hints from an Old Hand on	121
Expression in Landseape Photography	420
Extraneous Light in the Camera	-197
Eve and Brain, Lens and Plate	224
Eyes in Portraiture, The	336
1889, The Outcome of Photographic Progress in	68
Failures, Some of My	304
Financial Drift in Photography, The	255
Fireside Development	277
Fixing, Double, of Negatives	9
" of Negatives, The	94
Flash Light Photography	101
Flexible Celluloid Films	311
Foeussing, Errors in	30
Frost Studies	87
Glass Rod as a Substage Illuminator, etc	96
Gelatino-ehloride Paper, Toning	340
Hand Camera and its Defeets. The	-321
Hanging Pietures, A Simple Method of	226
Has the Developer of the Future Come ?	395
Hash	400

	AGE
Have the Public any Rights? etc	412
Home-made Photographic Appliances	37
	160
Human Face, from the Realistic Point of View	75
Hydroquinone, Further Experiences with	
How shall we build our Temple of Light ?	410
Looland	
Iceland	140
If not, Why not? Professionals vs. Amateurs	88
Impurities in Water, and some of their Effects, etc.	384
Indoor Photography at Night	144
Iron ProcessInstantaneous Photography	114
Instantaneous Photography	4
Interiors	209
Intensification	359
of Gelatine Plates with Silver	220
Interference Dienbracker	268
Interference Diaphragms Insurance, Photographers and	200
Insurance, Photographers and	508
Isochromatic Photography, Early	191
Judging at Photographic Competitions	93
Judging at Photographic Competitions	278
Kodak Manuals, Corrections in	29
Landscape enlarging	386
Landscape enlarging '' Photography, Expression in '' Painting in relation to	420
" Painting in relation to	377
Lantern Entertainments	37
	126
" Matters Slide Making, Some Hints on Slide Making, Some Hints on Slide Making Some Hints on State Sta	55
" " Plates	239
(1 Clides	
Shaes	175
All International Interchange	356
Coloring	180
" Eikonogen for	65
" " etc	269
" On the Making of	107
" On the Making of " Some Suggestions as to the Proper Subjects for,	
etc	182
" " The Storage of Negatives and	122
Lectures, Photographic Enlargements for	136
Long Mounts Divorsity of	292
Lens Mounts, Diversity of	005
Tamas Chaire f	235
Lenses, Choice of	2/3
" for Large Head Studies	293
" Our Modern Light Filters, The Spectroscopic Examination of	128
Light Filters, The Spectroscopic Examination of	372
Looking Ahead	406
Looking Backward	408
Magic Lantern. Notes on the	71
Magnesium Flash Photography	12
Magnesium Flash Photography "Lamp, A New	100
Maoriana	365

xviii

	PAGI
Matt-surface Paper, Printing on	. 320
Mealy Prints, A Remedy for	. 8f
Medical Photography	275
Microscopic Objects, Photomicrography vs. Drawing, etc	318
Mounting Photographic Prints, A Novel Method	. 188
Mounting Photographic Prints, A Novel Method	. 100
Multiple Camera, A. Negative Illuminator, A Simple	. 110
Negative Illuminator, A Simple	102
The Necessity of a Good	. 19
Negatives and Lantern Slides, The Storage of	. 122
"Injury to, from Platinum Paper	267
'Injury to, from Platinum Paper 'To Prevent Breakage in Printing Frame	. 41
Notes on some Novelties of the Year	. 432
Oil Paintings, How to Photograph, etc	125
On Tour and After	398
On Tour and After Over-exposed Plates, Treatment with Pyro	179
Painting in Relation to Landscape Photography	. 377
Parson and his Corners The	100
Parson and his Camera, The Photographic Societies of the British Isles and Colonies	. 176
Photographic Societies of the British Isles and Colomes	454
Photography in Futuro	. 34
" the Witness box, etc	. 354
" its best Estate	. 91
Photomicrographic Camera, A Home-made	. 344
Photomicrography vs. Drawing, etc	318
Picture Making, Hints on	-285
Platinum Paper, Direct Printing	162
" Injury to Negatives from	267
Portable Dark Room, My	
Portraiture, Amateur	
"Incongruities in Photographic	425
"The Eyes in	336
Practical Notes	
Dwinting Dath	$\frac{100}{310}$
Printing Bath " How to Hornswoggle	910
Deiestic and Most Company Description	42
Printing on Matt Surface Paper	320
" The Future of Photographic Professionals vs. Amateurs, If not, Why not?	6
Professionals vs. Amateurs, 11 not, why not?	88
Projectiles, The Photography of, During their Flight Pyro, A Plea for	212
Pyro, A Plea for	130
Pyrocatechine Development	297
Quality	-389
Reducing, Enlarging or	1
Relief Half Tone Process etc	399
Remarks, A Few Rambling	13
Retouching	-261
" Is it an Art?	112
" Portrait Negatives	145
Reversing Negatives	258
Reversing Negatives Rough Surfaced Paper, Silver Prints on	208
Semblance or Reality; Which Shall It Be?	161
Shutter Story. A	
VIII II	()

	PAGE
Silver Prints, Can They Be Permanent?	216
" Dark Tones On	44
" On Rough Surface Paper	. 208
Sizes of Photographs, etc	281
Societies and Clubs	. 60
Stained Glass Windows, Oil Paintings, etc., How to Photograph	125
Stars, Photography and the Magnitudes of the	232
Stereoscope, About the Improvement of	
Strange Adventures of a Camera in Rural England	328
Studio, A Cheap Private	71
Surveying, Recent Progress in Photographic	185
Swing Back vs. Sliding Front, Use of	252
Tables	438
The Most Refractive Rays and their Photographic Picture	414
Thickly Coated Plates, Manipulation of	229
Tonality in Photographs	218
Toning Bromide Prints, etc	340
Tourists' Camera Club	120
Transparency, How to Make, for Copying	63
Trays, Inexpensive	369
Varnishes for Lantern Slides, etc	
Water, Impurities in, etc.	384
Water Marks, Glue Reliefs for the Production of	74
Ways and Means	117
Where toSpend a Holiday with a Camera	259







PRINTED ON N. P. A. EXTRA BRILLIANT ALBUMEN PAPER.

A PORTRAIT STUDY,

BY

C. F. CONLY.

THE

International Annual

— of —

ANTHONY'S PHOTOGRAPHIC BULLETIN.

JUNE, 1890.

ENLARGING OR REDUCING.

By William Adcock, England.

To take small and enlarge is the bend of the day. "You press the button, we do the rest" is, to the suckling, too tempting to leave untried. It is, alas, literally true that "all the rest" is too frequently done by others; but, as fortunes are made by those who do it, without a grumble from those who pay for having it done, let it pass.

Beside this army of non-workers is another. It does more than press the button. Both to the stay-at-home and the tourist the hand camera has become a necessity. Its arrangements give facilities for clasping many subjects that would otherwise escape. It is the registrar not only of mountain and flood but of human types in distant lands. It is also the registrar, by those who will so use it, of human types of great interest found at our own doors.

I have ever considered a hand camera would be as well employed in securing the thousands of picturesque people and scenes in a city like London or Manchester, as in objects far away; and far better than in landscape work, or repeating the everlasting view-taking so prevalent with amateurs generally.

In saying this I take no exception to the hand camera. I use one and like it. I take no exception to enlargements—when good I admire them. I merely refuse to produce any myself. Resulting from my poor efforts, they are unsatisfactory. They

enlarge too much the defects of the negative. By increasing all its parts the feeble portion becomes prominent. I do the reverse of this by taking large direct pictures, and, if I want smaller, by reducing them. I find it as easy and far more interesting to make a lantern slide from a negative 15x12, as to print one by contact from a small negative the size of the slide. If I wish for an intermediate sized negative of my subject, I take a positive by reduction and print a negative from it by contact. The advantages I claim are these: By reduction of its parts I get the highest qualities of my original negative. I can repeat it in any size, and I possess in it qualities which, as a direct picture, no simple enlargement, without brush work, can give. I hold, too, a duplicate of negatives which to break or lose would be a loss to me, but which, by possessing a transparency, I can at any time restore.

To enable me to reduce these large negatives I have incurred no expense whatever. Up to 15x12 I plant my negative in the dark slide of a camera that size, and by four wooden wedges fasten it from falling. This I place against a large pane of ground glass looking north in the window of my dark room. The front of this camera, which is movable, is, of course withdrawn. I then place my half plate camera the proper distance away (some two or three feet) and point an eight inch focus R. R. lens on the negative, lighted by being near to the window. On the ground glass of this small camera is seen the picture I want, and it is taken in the slides I ordinarily use with that camera.

My small camera being too short, I took out the front, got a box and in the bottom of it fixed the lens and pulled off the lid. This lengthened my camera. Now the space between my two cameras I covered with a focussing cloth; but, as my room with gas turned down is dark, this is unnecessary. The only space from which it is necessary to exclude light is in the small box forming extension to my back camera, light would otherwise get on the sensitive plate. As I have no camera larger than 15x12 with a movable front, I fix my 20x16 negatives in a Tate's sugar box (sold at any grocer's for 3d.) Of course the lid and bottom of the box are both removed and the negative, fixed at one end, is placed against my window. This really represents a camera with its front and back removed and supplies all that is necessary for any amateur who wishes to reduce without having to buy what is being freely sold as essential for doing so.

A SHUTTER STORY.

By "Bill Allen."

How often we have been advised to mix brains with the developer, and how much better the developer works when it is provided with even a small quantity of the ingredient! The same medium when attached to the shutter will make a large difference in the results obtained. We see too much of the work done on the "you push the button, we do the rest" plan, and often wish that a trifle of the gray matter could be injected into the button. Let us take, for instance, a marine view with a graceful yacht as the object. Our friend with the "push button," with its spring screwed up to the highest possible notch, stands on the deck of a passing boat, and fires off shot after shot at anything which shows its head. Beside him is another sort of shutter operator with an ordinary camera and fairly good shutter, and brains. Does he shoot when his companion did? Oh no. Why not? Ask him and he says "when you pushed the button we were not only in the lee of the yacht, but the sun was almost directly behind it. In this case the water would show but little life, and the sails being in shadow I could get but a poor result which I think is equal to nothing." Soon afterward he did take his shot, and the print from that negative is one of the best I have ever seen. Now how did he get it? Simply by waiting until we were to the windward, which gave him rough water; the sun was right and made a beautiful effect of light and shade and the shutter was worked at very slow speed with a stop of "f 16." Now look at the train of reasoning. With high shutter speed, rough water looks like blocks of broken ice. posure is so short that the water cannot move and is therefore lifeless. Hence we must use a slow speed, if possible, about as quick as the eye, for we never see the water stand still, and consequently the eye is offended when a photograph shows it in the frozen state. Again a yacht does not rush off at sixty miles an hour and our boat is going in nearly the same direction. also would call for slow speed. Bright sunlight on white sails allows one to "stop down," and with all of these details and a trifle of the brains the result cannot but be good. The argument for using a large amount of discrimination with the shutter, applies to all cases and circumstances. If you want simply a lot of silhouettes with little or no detail, there could be no better advice

than to screw up the spring, open the lens to its widest extent, get on the shady side of your subject, and fire away. Then send your exposed plate to some professional to develop and print and bore your friends with an exhibition of photographs which you have taken. Still it is too true that a very great majority of the negatives now made by amateurs are produced with a uniform shutter speed. No focussing (if the image is sharp it is an accident), no stopping of the lens to fit the condition of illumination, in short without the shadow of reasoning as to the causes which will lead to pleasing effects, and the results, it is needless to say, are anything but satisfactory to those who appreciate good photography. Ergo, connect your shutter with your brain reservoir, and with careful consideration of all of the circumstances which surround your subject at the time you expose the plate, adjust your apparatus, squeeze the bulb, and study the result.

INSTANTANEOUS PHOTOGRAPHY.

By C. Angerer, Vienna.

Instantaneous photography, in its infancy, looked at as only an interesting experiment, has, owing to the many improvements which have been made in this process, attained importance during the present period, and it may therefore not be out of place to call attention to the practical application of instantaneous pictures.

The first instantaneous views obtained from an object in motion were hardly anything more than a shadow, and the views could be taken, only under the most favorable conditions. A white screen or wall was used as a background, in front of which an equestrian made his evolutions, a gymnast would drill in different positions, a man would throw the spear, etc. All this was accomplished in direct sunlight, and not much more than shadow pictures, without the least modulation, was all that could be achieved in the beginning. But even these primitive commencements gave rise to significant improvements in the manner of representation or pose by our artists. Heretofore, it was impossible to make a correct observation of some of the positions of man and beast when in extremely quick motion. The eye could not follow the bird on his wings, that is, the retina did not act with sufficient quickness for the eye to perceive the impres-

sion; we had no idea about the peculiar motions of human beings and animals running and jumping, birds flying, etc.

The study of instantaneous motions is of the greatest value for the artist. Although many motions, looked at separately, leave the impression of a caricature, or are debarred from the least sense of beauty, such positions in groups for instance, in battle scenes, cavalry manœuvres, boat races, running horses, etc., are by no means disturbing, but these very motions call forth the illusion of naturalness in life.

Since Ottomar Anschütz succeeded in obtaining instantaneous pictures with all the halftones in place of the former weak shadow pictures, instantaneous photography is not only made applicable for all possible scientific and artistic studies, but it is also made to serve technical purposes. Boat builders, for instance, add to their price lists, instantaneous views of boat races, regattas, etc. Competent judges and sporting men will recognize readily from the picture, and much better than from a drawing, the good qualities and superiority of a boat.

Instantaneous photography will also before long, claim its authority in portraiture, and it will really be no loss if the old-fashioned iron headrest with its clamps and supports and such similar apparatus are dispatched to the lumber room. Some photographers have already applied the more modern arrangements with the best success, although many portrait photographers still assert that instantaneous pictures in the gallery are a failure. It is possible then that a whole series of pictures from each sitter can be taken, for instance as Nadar in Paris did with his friend Chevreul, and that each picture can be supplied with some text for the comprehension of the observer, and to explain the expression of the face, whether it is laughing or contracts the muscles in anger.

Every improvement has its admirers and its opponents, and we are convinced that a correct method in this branch will soon be found.

How would it be if the portrait photographer, when making his pose, instead of advising the sitter to look in some imaginary direction, would have a small movable mirror on hand, and request the person to look at his or her own self while he uncaps the lense. He could easily take two pictures at the same time.

It will not be necessary for the photographer to remark: "Please keep quiet for a moment,"—"A pleasant expression, if

you please,"—it being a physiological fact, that a person while looking at his own self in the mirror, will absolutely keep quiet, move no eye, and assume the most pleasing expression which the mirror is ever capable of showing. Of course, care and practice are necessary, to expose quickly and not to tire the subject, and it would probably be well to cover the mirror until the proper time for exposure.

It is naturally everybody's desire, be he vain or not, that his picture should resemble the one in the looking glass. In any other position he is apt to ask: "Is that really I?" "Do I look like that?" and particularly if a portrait is taken, as only too frequently, with a rest, the head held tight by two iron prongs in an unaccustomed position and the eyes staring into space.

It sounds almost ironical, if in such a despairing and forced situation the portraitist exclaims in the most amiable manner: "So, will you now kindly keep steady for a few moments,—look towards this window, please,—not so serious—very well—I will be ready right away."

We hope that instantaneous photography will be in general use before long, and that particularly in portrait photography it will make friends and converts of the adherents of tetanus pictures.

THE FUTURE OF PHOTOGRAPHIC PRINTING.

By D. Bachrach, Jr., Baltimore, Md.

If any one will tell me to a certainty, the character of the prints and the methods used in their production in twenty years from now, I will tell him to an equal certainty of the standing of photography in the graphic arts and the financial standing of its followers.

Aside from all causes tending to the degradation of our artscience (and they are numerous enough), the general economic condition of the mass of the people, the greed of the black sheep called "Cheap Johns," the bad business methods or want of method of others, and the general panicky condition of photographers, induced by these causes, producing a lack of confidence in the hold on their patrons, and causing them to submit to cut prices and most degrading terms for fear of losing what little patronage they have; all these, some of which are only tempo-

rary in their nature, do not, in my opinion, have nearly as much influence in cheapening and degrading our business, as the well known evanescent character of our productions, which is becoming more thoroughly understood every day.

Solidity and permanence in all works of industry are more and more demanded, as the public taste becomes cultivated and developed; and those who are willing to pay high prices for such productions as we now issue as a rule, no matter how beautiful they may be, are becoming less numerous every year.

As people understand the uncertain character of our chemical productions, they will hesitate more and more to invest much money in our pictures, and use them as only temporary makeshifts for some artist to copy a portrait from, that has, at least, the merit of permanence, such as an engraving or etching possesses.

There can be no better illustration in a financial view (and that is a very important one for us), than to look at the prices that are paid for the reproductions of two famous and widely known copyists of paintings and works of art in Europe. I allude to Allinari of Rome, and Braun of Dornach. The former makes copies that are absolute perfection, judging from those in my possession, in the shape of albumenized paper photographs, and the latter equally, but no better, produces such results in carbon.

But mark the difference. A print by Braun that commands, say eight francs in Europe, can be duplicated the same size on albumenized paper by Allinari for two francs. And yet the latter is in some instances really finer, more delicate and pleasing than the former; it costs just as much in material and almost as much in labor. But there is where the difference begins. Braun's carbon print requires more skill and more intelligent labor, and above all, the public have been taught that they are absolutely permanent like an engraving.

That this element is going to be more and more a factor in the future, is beginning to be believed by men who have given thought to the subject. This craze for "a dozen cabinets, with a large one thrown in, for \$3.00," must sooner or later end, and with it will end a large part of the demand for our products, unless we have something better to bank on, than doubtful albumen prints and worse ones on bromide paper.

Let us not deceive ourselves. There are but two methods that even deserve the name of "permanent," the carbon and platinotype processes. I mean, of course, such photographs as are directly printed from negatives and do not include such processes as the Woodbury, Collotype, Photogravure, etc., which really produce prints in carbon.

I have come to this conclusion, not merely from observation, but from the evident character of the operations involved. The only production in silver that deserves being called permanent is the old wet plate collodion negative. In that the silver, by the action of the iron and light, is directly reduced to the pure metal in the allotropic form. This, easily freed from all traces of other chemicals, none of them remaining in a collodion film after a short washing, and protected from the action of air by varnish, is absolutely unchangeable. Even if exposed to the action of the atmosphere without varnish, it is only reduced to the dark sulphide by the action of the gases present in the atmosphere, the same as if it had been intensified with sulphide of potassium, and there the action stops.

This is apparently a contradiction, as sulphur is generally supposed to be the main cause of the fading of silver prints. Yes, but this is not a print such as we make on paper, but an image that contains, as I have said, a good body of pure metal, and this is not the case with prints on paper, whether produced by direct action of light, or developed (or rather stained it should be) with pyro and silver, alkaline pyro, or any other known method of developing positive prints; and whether, in case of direct printing, the medium is paper, gelatine or collodion.

Nothing like metallic silver is produced by the direct action of light on the salts of silver with an organic compound. It is at best but little more than a stain, and the process of a substitution with gold or platinum in the toning bath, improves the keeping quality somewhat, but it seldom goes far enough to insure real permanence.

I reject utterly the theory (and so do many others) that a mere trace of hyposulphite present can fade a print, especially if the latter is the result of a strong silver bath, upon strongly salted paper, and which has been thoroughly and completely toned by gold or platinum. Many have flattered themselves that collodiochloride emulsion was the future photographic print. Let one of these misguided people just watch and see how rapidly the surface of such a print changes color in the weakest toning solution, thus showing how small a quantity of silver was reduced by

the action of light, and what an infinitesimal part of such image is represented by the gold. Do we not all remember the evanescent character of the old time opal prints made with collodiochloride? I question if one of them that was made fifteen years ago is anything more than a shadow of its former self.

Among these all, the prints on albumenized paper or on plain salted paper, will more than hold their own.

In my opinion, the studio of the future, that will score a permanent and lasting success, is the one that adopts the carbon or some similar process for its plain work, and the platinotype as the foundation for the higher class of artistic work, and takes care to make that fact patent to the public, and keeps it before the public, in a persistent and consistent manner.

The result may come slowly but none the less surely, and it is just as certain, as that the people are willing to pay more for solid hardwood furniture, than for a thin veneer.

DOUBLE FIXING OF NEGATIVES.

By Dr. Leo Backelandt, New York.

There are many photographers who do not sufficiently fix their negatives. When all other operations are executed with all kinds of precautions, fixing is done very often in a careless manner, notwithstanding that perfect fixing is necessary for the preservation of the negative.

We want to make here, a distinction, between real and apparent fixing. When a negative is placed in a hypo solution, this liquid soaking into the film, dissolves by and by the unalterated silverbromide; this change can be observed easily, for the yellow color of the silver bromide disappears, and the negative becomes perfectly transparent in those parts where the light did not act upon the plate. But this process of solution is accompanied by a chemical reaction. The silver bromide acting on the sodium hyposulphite, exchanges one atom of silver for one atom of sodium, and as there are two atoms of sodium in one molecule of sodium hyposulphite, the resulting compound is a double salt containing both sodium and silver, and this we call silver sodium hyposulphite. The atom of sodium that has been substituted by silver is united during the same reaction to the bromine, the result of this chemical reaction being the formation of two soluble compounds, silver sodium hyposulphite and sodium bromide.

But this chemical reaction is only the first act of the fixing process. The bromide of silver has been changed into a soluble compound, and this compound wants now to be eliminated from the film, which constitutes the second act of this operation.

As long as all the soluble silver salt has not been removed from the film, we have but apparent fixing, and it is only after complete elimination of the silver sodium hyposulphite, that the fixing becomes real. What is now the best way to rid of the silver sodium hyposulphite? Nearly all photographers wash their negatives immediately after the silver bromide is dissolved from the film, but as the silver sodium sulphite diffuses through the whole thickness of the gelatine film, it takes a considerable time before all the soluble silver salt is eliminated. This can be best observed without any chemical test, by tasting the water that runs off a fixed plate after several minutes of washing, or by applying the tongue to the film side of one of the corners of such a plate. The taste is at first sweet and agreeable, but becomes after a few seconds most disagreeable and metallic.

If a negative is dried before complete elimination of the silversodium hyposulphite, it will turn yellow when exposed to the sunlight, and by this yellow stain the printing qualities of the negative suffer considerably; very often the negative is spoiled when the thickness of the film is not the same over the whole surface; then these thicker parts are stained most and it becomes difficult work to get good prints from such a negative.

It is very easy to avoid all these annoyances by fixing in two different hypo baths. Indeed the silver sodium hyposulphite is much more soluble in a sodium hyposulphite solution than in plain water and this gives us a means for better elimination of the double silver compound. When the plate seems to be fixed in the first hypo bath, that is, when all the silver bromide is dissolved, then instead of washing the plate immediately with water, put it in a fresh hypo solution about the strength of a regular hypo bath and leave the plate in this bath during about the same time as was required for fixing in the first bath. This second bath takes out very easily all the soluble silver. Wash now the plate in running water till all the absorbed hyposulphite of soda is removed. At first appearance it seems that the same result should be obtained by leaving the negative during a longer time in the first hypo bath, but this is not so, for this hypo solution contains already a good deal of silver and in this condition, the fixed negative cannot leave all its silver sodium hyposulphite. This can only be done by a subsequent washing with water and this takes a much longer time on account of the difficulty with which the silver sodium hyposulphite is dissolved by water.

Fixing the plates in two hypo solutions does not require much longer time than the ordinary method of fixing in one bath, and by this method the final washing with water is sooner complete. It increases not very much the cost of fixing, as the second bath can be used afterwards as a regular fixing bath, and hypo is so cheap that the question of price should not be taken into consideration when it is necessary to secure the good qualities of negatives which often have been obtained at the cost of much labor and trouble.

The traveling photographer or tourist, is often so situated that when developing his negatives, he is obliged to do this with the least amount of chemicals and trays, and then double fixing would be a luxury. In that case it is recommended to complete the provisory fixing as soon as he returns home, when he should place all his negatives in a fresh hypo bath, from fifteen to thirty minutes, and thereafter wash them carefully.

This second fixing should be done regularly when a negative needs to be intensified. It is a known fact that intensified negatives generally show a kind of fog over the whole plate, and that this fog appears during intensification and when bi-chloride of mercury is used, the solution of this salt gets milky very soon. This is the result of incomplete fixing and can be shown easily by the following experiment. Take an incompletely fixed negative, cut it in two pieces, put one of them in the solution of mercury bi-chloride and intensify by the usual processes, the resulting intensified half negative, will be fogged and the mercury solution will be milky. Repeat the same experiment with the other half of the negative, but after a second fixing as above described, and you will get a clear intensified negative and the mecury solution will not show any sign of white precipitate.

Double fixing gives but a small increase of trouble and this is largely rewarded by the more certain results and it is quite logical that when so much trouble is taken for exposure and development we should secure also the keeping qualities of the negative by careful fixing.

MAGNESIUM FLASH PHOTOGRAPHY, WITH THE PETROLEUM HANGING LAMP.

By Paul Baltin, Potsdam, Prussia.

The Magnesium-blitz-photography has made great progress lately, and hundreds of clever amateurs have taken hold of it, although mostly in the justified but very partial endeavor, to have their productions resemble as much as possible those taken by daylight. I have taken pains, and with good success, to go in the opposite direction and to make use of the advantages of the flash light for producing pictures, which have not the least resemblance to daylight views.

The best means to perform this is with the Fulgur apparatus of Dr. Hesekiel & Co., in Berlin, an arrangement by which Magnesium powder is thrown into the chimney of a gas or kerosene lamp, from the top and brought to ignition.





The kerosene hanging lamp is suspended in a room about 1.5 to 2 meters from the wall, thus securing a suitable background. If a handsome stove, bureau or some other suitable furniture can be placed on one side, it will be to the advantage of the general picture. Below the lamp, but nearer to the wall is an oval table with a light cover, around and behind which, the group is placed in proper pose. It may be remarked here, that for this kind of picture the cabinet size should preferably be adopted; eight persons can be easily grouped. As it is the purpose to have the picture appear in the proper gas or kerosene lamp illumination, it is absolutely necessary to have the light source on the picture, and to escape the otherwise unavoidable radiations of the bright light, a double lamp globe is employed, an upper one and a

smaller, reversed, lower one, which are both covered on the inside with ruby paper on their half turned towards the camera. Above the lamp, still covering the upper part of the globe, is fastened on chains, a sheet of cardboard, as the flame spreads oftentimes beyond the top of the chimney. It is also advisable to have a second lamp to light up the shadows, preferably a Fulgur apparatus or an ordinary kerosene lamp, which can be placed upon or close to the apparatus, to avoid wrong shadows.

Both apparatuses are connected with rubber tubing and are charged with pure magnesium powder. After this the group is arranged, the lighting being easily regulated by moving the hanging lamp and the exposure is made with a rapid portrait objective of at least three inches opening. This camera should by all means permit a changing of the ground glass in all directions, as otherwise groups cannot be taken with sufficient sharpness.

The most sensitive plates and a strong developer should be applied (I use hydroquinone after the formula described in last year's annual).

The pictures which I have produced in this way, and which are liked by many artists, have in their concentrated illumination, a very plastic effect, and care should be taken to embody a certain idea into each picture and to keep within bounds to obtain a really artistic picture after this method.

A FEW RAMBLING REMARKS.

By Jex Bardwell, Detroit, Mich.

On a cold Winter's evening of the present year, A. D. 1890, sitting by the side of a warm stove and reviewing the journals for the past year I could not help feeling that there was a desire on the part of many of our craft for a more general use of a mat surface paper—more particularly by those amateurs who run to the larger size of landscape work, and who fancy there is a beauty in a mat surface print not to be found in the high glaze or enamel surface that some so delight in.

In answer to a question, he said, "No, I do not think much of him as an artist, but see what a splendid finish he puts on his work." Plain paper was used both for negative and positive prints before the time of collodion, but not to any extent, and then only by a few. When the collodion process was practiced, the printing on paper became a necessity. It was natural, of course, that plain paper should be first used, and then by degrees. sizing of one kind or another was used till the double gloss albumen paper had to have a supplementary glazing or enameling to suit the taste "for such a beautiful finish." I like a landscape photograph, if not too small, better on plain paper as we call a mat surface print, than on a glazed surface, and as I having passed through the plain paper age, and done as others should do-made notes of my practice, good or bad, obtained all the reading matter pertaining to our craft possible and kept it, thought possibly that under the circumstances it might prove of interest to a few, if only a few, if I looked over a few pages of this now ancient history. It must be ancient—for few seem to know much about it—and very few months pass by, but some old process or apparatus, used in years gone by, is presented by some smart Aleck as just out.

We cannot judge an amateur's work by the same rule as a professional's. The professional work might be technically perfect as photographs, but the amateur's, really bad technically—but as pictures, good. One day a middle aged man came to me and desired me to print him a set of prints from about fifty negatives that he left with me for that purpose. I printed them; some were a little out of focus, some a little foggy, and in fact there were but few that I could not have rejected with a good heart; but he came for them, paid for them, and seemed much pleased at my work. It happened that day to be wet, and outside the rain was coming down quite briskly. We sat down together, and he told me how he and his little grandson had taken that journey together. They each knew as little as the other of photography, but you see the result, and he took one picture after another and related to me the incidents of that journey. Holding a print in his hand, though the picture was a little obscure, yet as he pointed ont details, "that is the pine woodland where we passed most of one day, coming out just down there, and when we came to this spot, that unfolded to our sight the ground that has taken us a week to cover," and so on from picture to picture, I took the journey with them in imagination; he paid for the work and was gone. I had printed, toned, washed and mounted those pictures and could not have told you one from another, but now-well, I did no more work that day, in everything I looked at, I saw one of those pictures. I printed for myself a set, and have no set of pictures in my collection that I prize more highly. Remember, I am casting no stones, for I have had passed through my hands, negatives and prints all done by amateurs, wherein the work was as good in every respect as that of any professional.

I had two prints from an 8 x 10 negative. One albumenized, glazed and enameled, the other a plain paper print from the same negative. They represented a wooded hill and stream just back of town, in fact a very pretty view. At this time there happened to be two persons examining these two pictures. One a photographer from a village close by, and the other his little girl. He called me to his side and wanted to know how much I would charge him to make his pictures shine like that. Just then his daughter, a little girl, called to him, "Pa! Pa!" exclaiming, "Pa, I bet there is wild strawberries on that hillside under that bunch of trees!" Well, what has all this to do with plain paper? It set me thinking nevertheless. In looking over my old notes one fact seemed to strike me, and that was that almost everybody had a different way of doing the same thing, that is, a different way to arrive at the same result. Causon Ferres, Turner, Hollingsworth and Whatman were the makers of the paper principally used; at one time only French, then English, and now no paper to be obtained but the Saxe and Rive. We must pass over the early days and come at once to the days of collodion which very soon brought about the necessity for paper prints. On account of the print sinking into the body of the paper it was found necessary to use some kind of sizing; albumen, gelatine, Irish moss, casein, arrowroot, gum lac emulsion were perhaps mostly used. In salting, chloride of ammonium, chloride of sodium and chloride of barium were the salts used, standing in strength as follows: chloride ammonium as 5, chloride of sodium as 6, and chloride of barium as 10, that is, 5 grains of chloride of ammonium are equal to 10 of barium. Their grade of color was taken to be chloride of sodium, cold black; chloride of ammonium. a warm black; chloride of barium, brown to brown black; but the toning bath will be responsible for any tone from light gray to sepia or black, according to how it is composed and how used. I find formulas for solar work to be afterwards used for color or india ink work, salted as low as from one and one-half to three grains of chloride of sodium to the ounce, again as much as thirty (30) to the ounce. And it was strongly advocated that without sufficient body of chloride of silver in the paper you cannot obtain strong prints and dark tones. For silvering, from thirty grains to the ounce up to one hundred and fifty-six grains of nitrate of silver to the ounce of water were used, and had I but the space, could give you some very curious mixtures used in those days to produce a black tone. Citric acid and citrate of soda were used in several of the salting solutions, and it modified the result all the way through. The silver bath was used either acid or neutral, and the paper mostly floated, but a modification of the silver bath, called the ammonia nitrate bath, gave very different results from the plain nitrate. It might be classed under three heads: first, to a forty-grain bath a few drops of ammonia just sufficient to cloud, filtered and the paper floated. The second, silver, sixty grains to the ounce of water, made as follows: take one ounce of silver (480 grains) and dissolve in four ounces of water, then add strongest aqua ammonia till precipitate is just about dissolved and make up to eight ounces with water. This is applied to the paper with a brush of cotton or a glass rod; after being dried should be printed and toned at once as it will not keep. Third, one ounce of silver (480) dissolved in six ounces of water, silver precipitated with ammonia, and the precipitate dissolved either with a few crystals of nitrate of ammonia or by carefully dropping in nitric acid, C. P., till almost clean and make up to eight ounces with water, filter. The same remarks apply to this as to the second. Four hundred and eighty grains of nitrate of silver may be dissolved in water and precipitated with hydrate of potash and well washed, then dissolved carefully with nitric acid, C. P., drop by drop, and then made up to eight ounces with water. Albumenized paper may be floated on this bath for very short time and dried, and will produce perfectly black tones of the blackest kind if properly toned with a lime toning bath. The only plain paper prints that are anyway reasonably perfect at this date having been made from 1854 up to 1890, are those that were either simply fixed in bath of hypo, or toned in a bath of sel d'or and fixed in a bath of fresh hypo. Albumen paper prints, containing more or less albumen, up to 1860 and 1861, were toned in sel d'or or the compound bath, and are all more or less, generally more, gone, plain paper keeping better than the albumenized. After 1861, for some years, I used a lime toning bath (these prints were made





from stronger negatives than are made now) and the prints (and I can lay my hands on hundreds of them) are clear and apparently as bright and fresh as when made, and very much better than many of the prints I have made since that time. Most of our prints, either plain or albumenized, up to 1866 (and some lately) were toned in the compound bath and it would take almost a page, to name the many different substances added to it to produce its coloring property. It was first made up as sel d'or, then by adding more hypo it was found to fix at the same time; it was soon observed that the older it got, the less gold it needed, till at last it was made without any gold whatever. The earliest paper prints were fixed in common salt, and R. Hunt had some for eight years unchanged.

In 1853 R. Hunt recommended gold for "velvet toning."

- " Weld Taylor used acetate of lead for producing black tones.
- " Sir W. Newton recommended alum for removing last traces of hypo.
- " 1855 Thomas Sutton recommended the sel d'or bath.
- " F. Maxwell Lyte, the phosphate of soda and borax bath.
- " 1856 L' abbe Laborde, acetate of soda bath.
- " 1854 to 1858 LeGray, the lime bath."
- " 1860 carbonate of soda bath.

The old compound bath had added to the hypo and gold, nitrate of silver, chloride of silver, chloride of lead, chloride of silver blackened by light, acetic acid, acetate of lead, perchloride of iron, iodide of silver and other things that I have no note of at the moment. I also observed that plain paper prints unmounted, seem to keep better than those mounted. I don't think the mountant had so much to do with this as the mounts.

And now I propose just to give a few little notes that may be of use to those who may desire to do some plain paper printing: First, a good arrowroot paper will be found all right; a paper that gives very good results is prepared as follows: water, 10 ounces; gelatine, 10 grains; sugar of milk, 300 grains, chloride of sodium, 100 grains. Take 10 sheets of paper, heavy Saxe, and immerse one after the other; when the ten are in, turn them over, and take them out one after another and hang up to dry. Sensitize in a 40 grain silver bath, single drop of ammonia, or you may use the ammonia nitrate bath. This last bath, in con-

junction with the sel d'or bath, will give black tones; silvered on the first bath, and with sixty grains of sulphocyanide of ammonia to the sel d'or bath, will give magnificient sepia tones. The sel d'or bath is made as follows: Take 8 ounces of water, in which dissolve 45 grains of hypo; in 2 ounces of water dissolve 15 grains of chloride of gold, then pour the gold solution into the 8 ounces of hypo sol., set aside for one day and it is then ready for use. Always fix in a fresh solution of hypo. The great trouble in toning plain paper in the ordinary gold baths used nowadays is that they are too strong. Citric acid, citrate of soda and citrate of ammonia can be added with advantage to the salting bath, in which case a stronger gold bath can be used, and it is better in this case to use the ammonia nitrate of silver bath, or fume the paper. Fuming was not known in the early past. If you so desire you can use the following salting solution: Albumen, 3 ounces; water, 7; chloride of ammonium, 100 grains; citrate of soda, 10 grains. The albumen must of course be well broken up and mixed with the water. The chloride and citrate being added at same time, let the froth settle well and then filter and float the paper, this salting will stand any of the usual gold baths.

Never use a fixing bath a second time. Plain paper prints can be much improved when taken from the last washing water, surface dried with a clean blotter, and brushed on the face of the print with the following: Albumen, 1 part; water, 1 part; well shaken, and the filtered solution brushed over the print in such a manner as not to raise any quantity of small bubbles. This solution of albumen sinks into the moist paper and dries without gloss and has the effect of brightening up the shadows wonderfully. Plain paper prints are made use of, by the photo mechanical draughtsman. Inking the outlines and as much more as he may desire, the print is then bleached and the inking is then continued. This paper should be of such body as not to allow the ink to run, as it would do if the paper was unsized. In regard to the bleaching. It is usually done with a solution of bi-chloride of mercury, by changing the dark print into a white one of chloride of silver, and, after being washed, dried. This paper sometimes is not used until several days are passed, and it is found to be stained, and frequently the dark photograph reappears more or less; and could be brought back very perfectly by a weak solution of hypo. Instead of using the bi-chloride of mercury, make astrong solution of cyamide of potassium, into which has been put a few crystals of iodine. This solution will bleach your print for good, and the paper will remain white for a long time. Plain paper is very useful in making transparencies, especially if of a large size. For this purpose the printing should be in the paper in contradistinction to surface printing. I have seen some very fine results produced by printing from the back of the sensitized paper. I finish up these rambling remarks by quoting Jabez Hughes, "Weakness and flatness of image is generally caused by the negative being deficient in contrast."

THE NECESSITY OF A GOOD NEGATIVE.

By Catharine Weed Barnes, Albany, N. Y.

This proposition would seem to need no demonstration, but that it does, and that one is no Don Quixote who attempts to prove it, can easily be seen when the statement is made in all seriousness that an intensified negative is better than a fully timed and developed one. Theoretically, all camerists believe in a good negative, but they differ widely in their views of what constitutes it. There are times when one is forced to resort to what seems in my mind the necessary evil of intensification, but none the less an evil, for I always feel that an intensified negative requires an apology. It is so much easier to use but little thought in exposure or development, and then trust to retouching or intensification to make everything all right; that the beginner soon learns to be satisfied with careless work. Of course, a good negative presupposes a good plate, and I feel compelled to remark on the general economy of plate makers as regards the use of silver. Increasing the quantity of pyro or eiko, does not make up the loss, and while the negative is often exceedingly sharp and clear, it has not enough brilliancy or density to print well. The demand is so great for fast plates, that quality is less considered than quantity.

Landscapes bear intensification better than interiors or portraits, and I use the formula of Herr Stieglitz, one part bichromate of potassium to one hundred parts of water. For lantern slides, there is little need of after treatment, if they, as well as the negatives, have been carefully timed, and the slides developed with ferrous oxalate or eikonogen, the latter to be preferred if

for nothing more than its cleanliness. But for negatives and positives the simpler the developer the better, and if it does the work economically and well nothing is gained by change.

"Change jes' for change is like them big hotels Where they shift plates, an' let ye live on smells."

When the developer is made in one's own laboratory there is little reason for change, as the operator can select pure chemicals and use them as needed. I wonder that so much ready prepared developer is sold. Surely there is a peculiar satisfaction in doing all such work independently of outside help, except as to suggestions, and even they should be passed through the alembic of one's own experience to be really useful.

. My attention was drawn to this importance of a good negative by a request to make some lautern slides for a friend, from some Mexican detective views. The latter were taken under constantly varying circumstances and conditions of light; most of the holders emptied and refilled on a moving train, and to crown all, taken in a camera which I had not previously well tested. The results were not uniformly successful, and after repeated trials, I laid aside the negatives and took some timed ones, clear, sharp, full of contrast and softness, put them in the reducing camera, and life again seemed worth living. Three different developers had been used in attempting my fruitless task, and any one of them worked well when I used a good negative. My intention is to use eiko henceforth, either combined with carbonate and sulphite of sodium and bromide, or simply with sulphite of sodium. In the latter case it is best not to overtime. not seem to be entire unanimity of opinion among camerists as to using eiko for negatives. The devotees of pyro lift their stained hands in protestation that, although the negatives look well, eiko does not allow sufficient latitude in development, and they do not print well. But eiko has not yet, I believe, shown all it can do, and it certainly has some very great advantages in its favor, being infinitely more convenient for slide work than ferrous oxalate, and is excellent for bromides, while it is not needful to guard the solution against the hypo.

An out of focus negative will sometimes reduce effectively for slide work, but it is not safe to depend upon such, and I have heard of an amateur who declared his criticised slides were as sharp as the negatives. It is astonishing that any amateur who really, as the name implies, loves his work, can be contented

with anything but steadily urging upward his standard of photographic perfection. One thing which too often prevents it, is a somewhat prevalent but mistaken idea as to what constitutes "artistic" work. The word sounds well to all ears as being closely allied to genius-or at least a comprehension of it, and those who have given photography no practical attention, are apt to consider "technical" and "artistic" by no means synonymous terms. So, many an amateur displaying a picture good as to point of view, and, if a figure, nicely posed, but with the greater part out of focus, and so overtimed that face and sky have the same dull tint, calls it "artistic" and sneers at "mere technical excellence." Did Beethoven, laboring on the wonderful harmonies of the Choral Symphony, allow any part to fall below the rest in receiving his faithful attention, or did Fra Angelico, painting, as he knelt, the glories of the future world, feel that any detail was beneath his notice? It is no wonder that technical excellence is undervalued by those who do not care for or have never succeeded in attaining it, but those who comprehend and who in striving to attain it are also able to breathe into it the breath of artistic life, are those to whom the photographic world can best look as exemplars. Art and science must labor together in every branch of camera work, and neither deserves exaltation at the expense of the other. A picture will never be less artistic for being carried faithfully through its various stages from negative to finished print, while those who rest satisfied with blurred outlines and dull, flat tones in their work, can never justly claim for it artistic preëminence, however fine the subject. To make a good negative, more than genius is needed. Farmer Ashfield, in that charming old drama, "Speed the Plough," says, "I had a horse named Genius once, but—he wouldn't work." So, in the great world drama, progress is not always best served by brilliant genius, but by carefully directed hard work-taking the great discoveries or inspirations and making them practical. In camera work, probably as many negatives have been spoiled by careless development as incorrect timing, and, where a film roll is used, one is tempted to make a great many utterly useless pictures. If all roads lead to Rome, many are the ones to a good negative; and what suits one person's mode of working will utterly fail with another. A friend once asked to copy a formula pasted up in my dark room, and looked greatly surprised at my saying it was never used twice alike.

During development, two or more graduates are used containing developer in different degrees of strength, with bromide, alum, and hypo solutions near at hand, to say nothing of the can of pyro and plenty of running water. In using eiko, most of these are not needed. I have discarded the light of lamp or gas during the day in favor of a ruby and orange covering over the window, the upper sash permanent, the lower removable. This vastly improves the air of the room, and while a little trying to the eyes, it enables me to work anywhere without danger of accident, and I have not yet fogged a plate. Some time ago the rubber tubing over the washing tank was removed, and a rose sprinkler attached to the faucet, which is a great improvement. Devoting myself mainly to interiors and portraits, I find it necessary to entirely change the manner of development in attempting outdoor work, and am constantly tempted to overtime. This shows the folly of expecting one lens to do the work of several, and do it well, when even with proper lenses it is difficult to suddenly change one's special branch of camera work. One camera is much like another to the ordinary observer, who wonders that you cannot use the one lens under the skylight, in a room and outdoors, with a like good result. One great trouble with negatives, is using too small a lens for the plate, especially with a wide angle, and no lens should be purchased without a thorough test. I use a wide angle, listed to cover the next size larger plate, which ensures clear corners.

Architectural views are often badly placed on the plate, take up too much room, do not "compose" well, and the vertical lines are anything but straight. There should be no excuse for this last fault if the lens is a good one; it is absolutely unpardonable. The camerist who has not a straight eye should use a spirit level. Only do not let the building or room look as if an earthquake was imminent. It is a good plan to look over one's negatives every few months, and ruthlessly destroy the poor ones, until the lesson is learned not to keep them. It is also well to duplicate especially valuable ones at the time of taking if possible; at any rate, copy them, and I have been urged to use films for that purpose.

A good negative is to its happy maker, a "thing of beauty" and deserves, from the moment of taking the plate from the box until the finished print is ready for exhibition, all the care, thought and inspiration that the painter gives to his canvas, or

the sculptor to his marble. The more thoroughly this is believed and practiced, the fainter will grow the cry, "machine work" as applied to the results of the camera, which, great as has been its progress in recent years, is only on the threshold of its possibilities. All the various processes constantly coming into notice, the chemical labyrinth it is such a keen pleasure to explore, all the wonders of scientific research brought within possible reach of every camerist, form a solid foundation for the finest, superstructure, artistic ability can design. The mind should constantly broaden and the mental vision grow clearer with every step forward in the art science, which, faithfully pursued and fully appreciated, cannot fail of proving a liberal education.

LANTERN SLIDES.

By Joseph P. Beach, Cheshire, Conn.

It is now about five years since I first began to make lantern slides. Believing that my experience may be of some service to others, I take this opportunity of making it public.

Beginning with the neutral oxalate developer, and a brand of plates that were warranted to work as advertised, I began the business of slide making with a stock of negatives about as good as any experienced amateur would feel satisfied with.

Having read everything that could teach the art of lantern slide making, the exposures were duly made, and development undertaken. The first dozen plates came up with the high lights nearly as black as ordinary negatives, but transparent in the lantern. The next dozen came out so weak in the high lights and shadows, that they made but little impression upon the screen. Another dozen plates were fairly good in spots, but covered with an irridescent film, that seemed to indicate age—bad packing, or some defect in the manufacture. Several dozen of these plates yielded me from six to eight fairly good lantern slides, even after I had been at infinite pains to follow the somewhat complicated directions of the manufacturer.

After investing more money in some additional packages of plates, operations were again renewed, and every detail attended to, necessary to secure favorable results. The proper exposure was obtained only by experiments, and then it seemed as if lantern slides were to be an easy matter. Alas! it was a delu-

sion. This lot of plates looked as if the dust fiend had been abroad. At least, that was what the manufacturer said when he was appealed to, and then he gave an order on the dealer to furnish me, free of charge, one dozen plates of his latest brand which would "surely" meet the "spotted" difficulty complained of.

This dozen of plates was used up according to the manufacturer's directions, which were now entirely changed from those he put forth with the first lot alluded to. Here let me say, that at this time, plate manufacturers made many changes in their fixing solutions and other directions, which amateurs expensively followed without obtaining very favorable results.

Out of the dozen plates—which did not cost me a cent—I got five lantern slides that were worth mounting, and three others that could be used with a powerful light.

Then came a craze of chloride plates. With these, when fresh and working according to the printed directions, good slides—with an Autumnal brown tint in the shadows—were obtained; but it is needless to remark, that the brown tinge was not suitable for some of the pictures which one would like to make into lantern slides.

It was now time to look about for a brand of plates on which lantern slides could be made *every time*, or at any rate, with only a minimum of loss, and not the almost entire failures that followed previous operations.

I could reasonably deem myself somewhat of an expert. The negatives were *right*, the exposures were *right*, the manipulation was *right*; according to scores of tally books which minutely record the work of those days. Where then, was the fault, if not in the plate?

A new lot of plates, made expressly for me—by a young man in Brooklyn—yielded, in my hands for the first time—under oxalate development—ninety-five per cent. of slides; and, as some evidence that the slides were of good quality, a lantern slide expert reported two dozen of them fit for a public exhibition.

After this a lantern slide would result nearly every time on these plates, which, however, were not readily obtained; and, later, the supply ceased.

Skirmishing among the dealers, various new brands of lantern slide plates were found. Experiment soon made it apparent to me that where one or two dozen would work all right, the next

purchase of plates would be found more or less unreliable, or they had been too long in stock when sold by the dealer. Is not this too often the case with dealers in photo materials? In a town in Massachusetts I once bought a supply of photo plates, which, when opened, showed so much deterioration, that only one plate out of the package was used. This package, and the other five were sent back to the dealer. He acknowledged the receipt of the goods, said he would send them to the maker, but from that day to this no money or photo plates have been returned to the purchaser. And right here, is it not a good place to say that the manufacturers of plates would save their customers money by branding upon every package the date of its manufacture.

It is certain that lantern slide plates do not keep as well as the regular photo, and in order to be sure of a good slide, the amateur must be sure of good fresh plates—if he depends upon a manufacturer for his supply.

Hydroquinone, as a developer of lantern slides, next became the craze of amateur slide makers. With many others, I invested in the new developer, spent plenty of time and considerable money, which yielded me a few *blue* black slides, that were never satisfactory when shown upon the screen.

We now come to the latest fad in lantern slide developers, viz., Eikonogen. It is a good developer in the hands of an expert chemist and when obtained from authentic sources; but it is also one of those developers that have to be experimented with by the tyro, until his experience teaches just how much to use, and just where to stop the development. It is said that it can be used over and over again; that no fog need be apprehended etc. This may be true, but my experience does not endorse it. Eikonogen for lantern slides is cheaper and easier than any other developer, but it has not yet satisfied me enough to warrant giving in this connection any special formula for its use on lantern slides. Let every slide maker, work this developer out to suit himself, and in a short time he will, if he spoils enough plates, find out the right proportions to use.

The reader, by this time, will want to know some of the conclusions reached by the writer of the foregoing experience. Briefly they are as follows:

First. The maker of lantern slides should not expect that every dozen plates he buys will yield a dozen slides; but, after due

experience, and study of the processes, he ought to expect a reasonable number of good slides from every dozen plates, made by a reliable manufacturer.

Second. A good negative is pretty sure to yield a good slide, if the exposure is according to the sensitivness of the lantern plate. And in this connection, a good negative requires from five to ten seconds of contact in subdued daylight, or from ten to fifteen seconds of the light from a student lamp, or its equivalent in gas, at a distance of say two feet. My best slides have been made by daylight exposures, and the results were fifty per cent. more uniform.

Third. The development should be slow and nearly equal all over the plate. The high lights should be the last to become dark, and when they do show blackness, better stop and put the plate at once into a very weak solution in which has been added a dozen or more drops of bromide of potassium. This will continue to blacken the shadows, while the high lights are not appreciably affected.

Fourth. The fixing should be strong and full. Freshly made Hypo, one ounce to four or five of water, leaving the slide in this bath until it has acted thoroughly.

Fifth. An alum bath, of one ounce of alum to ten ounces of water, with or without a little citric acid, is a good finish to harden the film and clear the slide.

Sixth. After development, wash; after Hypo, wash; after alum, wash; and in all the manipulations, be cleanly, especially in handling plates.

Finally. To know a good slide, is to observe the high lights. The clouds should be almost clear glass; that is, if the negative is dense in that portion. Faces of people should be clear glass, and all other lights should be as nearly clear as possible; and if they are not, the film has been stained in the development, or by some other cause. In a good slide the shadows will be of a good black color, and it will not be found necessary to tone any slide, properly made from a suitable negative. The writer's experience suggests to him that he does not yet know how to make a good lantern slide with poor materials, and that it is only waste of time and money to try to get a decent slide out of a negative that requires half an hour in bright sunlight to produce an indifferent print.

A kerosene light in the magic lantern is the best to use, to

judge of the work in slide making. If the slide will pass muster in such a lantern, it is sure to be a good one when a lime light is turned upon it.

THE FUTURE OF THE DETECTIVE CAMERA.

By Alexander Black, President Photographic Department Brooklyn Institute.

I have declared on more than one occasion that the hand camera must become the camera of the future. Its present advance is certainly quite extraordinary, in spite of the contemptuous allusions that have escaped those who can see no art possibilities in a camera without legs. The superstition that a camera must be anchored before it can exercise any artistic functions, is very curious. One of the most distinguished artist photographers in this country, wrote to me less than a year ago that he had never troubled himself about a hand camera because of its artistic limitations, and particularly because it made artistic composition impossible. No theory could astonish me more than this. If we were to think only of a certain limited number of subjects it is easy to recognize the usefulness of the stationary camera. The whole range of subjects once possible to the camera, required the tripod, or some solid rest. But since the photographic horizon has broadened, it is quite plain that our machinery must readjust itself to the new necessities. Photography was once confined to subjects that could be posed, or, like natural scenery, held their place without posing. But photography has no longer any such narrow boundaries. To say that only the stationary camera is available, is to say that only those subjects are available which can be mechanically controlled. If we shut out all other subjects save those which can be brought within a specific range and composed within certain lines, what a wealth we are casting away! We are tossing aside the pure gold for 18 carat metal. To be sure, pure gold is too soft for some purposes, and there may be some point of view from which the alloy of conscious preparation may give a finer artistic quality. But photography is after all but an imperfect medium when we come to compete directly with the painter's imaginative opportunities. Our great hope in competition with other forms of art, is not in the literal translation of textures and forms, but in the interpretation of life in those phases which are impossible to the artist, who has only the pencil to aid him.

When I speak of subjects impossible to the draughtsman, I do not mean merely very rapid subjects. In the superficial sense these are impossible of accurate translation by the human eye, which, in comparison with a good lens, is a very inferior instrument. People speak of what the eye sees, as if that were the end of the argument. Now the eye sees nothing that it does not know enough to look for. When it knows exactly how a horse trots it will see the horse trot that way. When it comprehends the gallop as a scientific fact, it will never see a horse with four legs extended as painters saw it for hundreds of years. So that the eye must yield every time to the lens. But this is not the important point. There are subtle phases of visible life—a mere facial grimace, perhaps, like the glitter on a stream, that the artist can only reproduce by imperfect recollection. lens needs no memory. The eye sees one thing at a time. lens sees everything within the same range. Thus a hand camera picture of a street tragedy, will give us more facts and more genuine human sentiment than a score of the finest examples of studied art. Nature often "composes" very badly from a single point of view, but give a man a quick choice of point of view and nature can be trusted to compose more strikingly than any human artist. And besides, the immediate product is of trifling value in comparison with what a picture so made, has the power to suggest. Photography can render a splendid service to art, to science, to sociology and to literature, without making "pictures" at all. Yet the direct product of a detective camera very often challenges comparison on every ground, with the most carefully studied work. If it can so often equal the work of the stationary camera in composition, in accuracy, and in vigor, the hand camera, with all its possibilities in seizing the expression of transient emotions, in catching the spirit of humanity as distinguished from inanimate nature, in perpetuating those most precious and otherwise elusive unconscious revelations of character, the hand camera must certainly be acknowledged to have attained the highest utility.

There is too much of bigotry in the assumption occasionally observed among various classes of objectors, that the hand camera has necessarily this and that form or limitation. The hand camera has absolutely no limitation, save that of size, It should

be made to perform every service. It should be convertible into a stationary camera more quickly than the stationary camera itself can be made ready. The ideal "Detective"—and we are not far from that now—will do everything a camera has ever been called upon to do, and will have this characteristic without losing any of its availability as a detective. As for size, that is actually no limitation. Enlargement bauishes this limitation. One who would sacrifice an idea for the sake of getting a little "sharpness," has not the soul of an artist nor the penetration of a philosopher. What we can put into a photographic print will always be very much less important than what we can get out of it.

CORRECTIONS IN KODAK MANUALS.

By Dr. H. Carrington Bolton, New York.

Amateurs using the larger sized Kodaks, especially Nos. 2, 3 and 4, will be interested to note two corrections in the well written little manuals that accompany these ingenious cameras. The corrections, or amendments, I secured at the factory of the Eastman Company, Rochester, on the occasion of a recent visit.

Having experienced difficulty in setting the shutter for time exposures, I stated my case and was informed that a new plan had been adopted since issuing the Manuals. My copy (for No. 4, Jr.) bears the date February, 1890. Erase the text in Part I, section third, under "How to make Exposures within the House," and substitute following: "1. To set the shutter open, put in the plug, press the button and pull the cord out about one inch (until you feel the spring acting), then release the button and pull gently until you hear the trigger snap into the first notch."

By this plan the shutter is set open on the rise instead of on the fall, and with greater assurance of success.

The second amendment relates to the soaking solution used after development to prevent curling of the thin film as given in Part Third, Section A. I noticed that my films shrunk greatly, from ½ to ¾ inch all around, and prints from them were far smaller than they should be. This I was informed is due to the presence of wood alcohol in soaking solution. The formula should read: "Glycerine, ½ ounce to ¾ ounce; water, 16 ounces." The amount of glycerine to vary according to the weather; the drier the atmosphere the greater the proportion of glycerine,

An experiment made in my presence at the factory, showed that strong alcohol not only shrinks up the film, but converts it into a leather like substance.

In drying the films the workmen pin them by the four corners to a clean board, and do not suspend them as shown in the Kodak Manuals.

I shall not attempt here to describe the interesting establishment at Rochester, over which I was conducted with great courtesy.

ERRORS IN FOCUSSING, ARISING FROM NEGLECT OF THE SPHERICAL ABERRATION OF THE LENS.

By R. H. Bow, C. E., Edinburgh, Scotland.

It is a very common practice to focus with a large stop and then to insert a small one with which to take the photograph. Now in landscape and other lenses suited to embrace a wide angle of subject, there is usually a considerable amount of positive spherical aberration, the effect of which is, that the best focal distance with the smaller stop will be longer than when the larger aperture is used; so that if the best focal adjustment for the view is made with the larger stop in, the definition will be far from perfect when the small stop is substituted.

There will sometimes occur an unintentional compensation when the sharpest focus with the larger stop is chosen for the centre of the picture, for then the longer focal distance that accompanies the smaller stop to be actually used will, with the usual curvature of field, render the general definition over the whole picture more equable.

When, as I think is the case with many lenses, the attempt to flatten the field is pushed too far, we have several defects increased. There is greater separation of the primary from the secondary focal lines, or places of best definition for vertical and horizontal lines (such as the masts and yards of a ship) away to the side of the picture*, or, in other words, much astigmation for the very oblique pencils. Again, there is increased spherical aberration, rendering the definition with a fairly large stop very imperfect; and this augmented aberration renders the error I am now calling attention to of more importance.

Perhaps the error may have the most seriously detrimental

^{*} See my paper in the British Journal of Photography, 1863, pages 228 and 254.

effect when copying fine line engravings, where it is most desirable that as pure a definition as possible should be secured.

It will be well then for the photographer to know the amount of the aberration present in his lens; this he may easily arrive at by carefully examining the two focal distances for the large and small stops to be used. He should choose a brilliant object so that its image with the smaller stop may be well seen; it may be a sheet of black or dark paper having some fine perforations, cross lines or a rayed star cut out of it, and this should be fixed up at the window so that the light from the sky may be received through the openings, or any other equivalent arrangement. In the case of many a lens a difference amounting to say, two or more per centum of the focal length may be detected, and this will be the amount of correction to be made after focusing with the larger stop.

AMATEUR WORK WHICH PAYS.

By Mary Scott Boyd, Newburgh, N. Y.

Enthusiasts in every art and science meet opposition. There are always the prejudiced, indifferent and the ignorant, upon whom the most potent arguments fail to make impression; and to every well drawn line of reasoning in favor, there is always rebutting testimony. Ten years ago, before the invention of the dry plate, photography was practiced as a profession, and a lucrative one it has proved. Now the land is flooded with a high tide of amateur enthusiasm over the art, and grave heads are shaken in disapproval over the waste of time and money. To the first objection it may be simply said, no occupation which keeps men and women in the open air and in the sunshine can, within reasonable limits, be a "waste of time." Health and strength are gained by just such out-of-door life, as much and satisfactory work with the camera entails.

Of the money spent, undoubtedly, dollars upon dollars have been squandered in amateur work; but one spends money upon foolish pleasures and employments, which have not one half as many lasting advantages. Then, too, often the money expended results in money gained. I know more than one amateur who has paid for outfit and all expenses by the work done by the camera. Books are illustrated by clever views, and there is de-

mand for such. Also many artists pay well for subject studies, secured by enterprising amateurs, who exercise taste and judgment, and who can secure many bits of landscape and genre pictures in an afternoon of photographic zeal. The search for health and wealth, rarely go hand in hand. Worn out, overtaxed brains do not frequently find an El Dorado, and yet a few hints which may be helpfully suggestive, can be given as to the possibility of taking a trip for health's sake, and making it profitable in a financial point of view. A few months since a total rest was prescribed, with change of air and scene. A Raymond ticket was purchased for California, and my detective camera put into good working order, and then I cast about for some inspiration to take pictures, beyond that of doing so for mere pleasure. It came—a New York friend with a goodly investment in land in Santa Barbara County, and with a desire to boom it, was preparing a brochure—a half descriptive story of Southern California, for which he desired illustrations. I undertook the work. My portfolio lies before me now, with the results of six or eight happy weeks in the land of sun and flowers. It might not be amiss to say just here that I found more than one ranchman glad to have pictures taken of himself, his horses, and blooded stock, and his "palace," or "hut" as the case might be. And for these, had I chosen, I could have charged many times the price they cost me, and yet they would have come lower than the work of the local photographer. Any enterprising young tourist if he carries his camera, "can find plenty of work and fun among the jolly fellows who ranch it" in the West.

I was fortunate enough to be entertained by a young Eastern man and his wife, friends of mine, who were growing olives, and growing strong in the Santa Ynez Valley. The stage drive from Santa Barbara to Los Olivos, is over a picturesque route, forty-five or fifty miles long, and there are many exciting moments in the day's journey, when the four horses dash around rocky points, or down steep declines of the Santa Ynez Mountains. The vegetation in many parts is luxuriant; the live oaks, green all the year round, are abundant. The white oaks, when I first arrived, were draped in festoons of gray moss, and just putting forth little yellow green leaves. Hundreds of flowers were in bloom, and the low rolling mesa lands and mountain sides were gorgeous with all bright colors. The weather, during the months of February to June, is perfect; the mornings and evenings cool,



NEGATIVE BY WEST & SON.

YACHT IREX.

WINNING RACE AT HARWICH, ENGLAND.



the middle of the day a hot sun shines, and in the afternoon oftentimes a steady wind blows until sundown. As I look through my portfolio, I find many pictures which bring to mind days of delicious, lazy enjoyment. Some will illustrate my friend's book, others have a romance already associated with them, a veritable love story, with a marriage in the mission church, of the lovers, José and Carmelita. Many pictures have I, of the handsome Spanish lad and the pretty girl he loved. Theirs was a pure and sweet courtship—though like many other wooers, poor José had difficulty in winning his sweetheart. She was an orphan, living with a stern old uncle, who kept a little shop, and whose family boasted blood, too blue for the aspirations of a humble born fellow like José; but it was the old story of the love that conquers all obstacles, and they were married one bright day by good Father Farelly. I think they never quite forgave themselves for not waiting a few weeks later, and being married by the bishop, who came to the mission. Then the services were conducted in Spanish. People crowded in from all about, and the religious fervor, which is at a rather low ebb through the greater part of the year, rose to a height of enthusiasm. The glory of this mission of Santa Ynez is gone; it was founded by the Franciscan Fathers in 1802, and zealous monks walked through the cool and shady cloisters. Now, only one faithful priest is there, who holds services twice a month, and occasional prayers. The mission buildings are low and straggling, built of adobe bricks made by the mission Indians. In some of the pillars are bricks specially blest, which were brought from Spain. The church is at one end, with a low flat tower, in whose arches swing the bells. Arched cloisters join it to the other buildings, the old quarters of the monks, etc. Over the adobe is a pink plaster or stucco, which has peeled off in some places showing the bricks. The old mission is picturesque in its quaintness, and is suggestive of the good work done by the Spanish Brotherhood nearly a hundred years ago. I turn over the pictures of the interior and exterior views of the church and here again are José and Carmelita. I have them in holiday attire, for it is a festa. Prayers have been said to their patron saints, and now José, with his red ribboned guitar, is leaning against a sturdy live oak, while Carmelita is seated on the grass, fashioning a wreath of gay flowers for his hat. His sweet tenor voice rises and falls in musical cadencesMe boi, me boi, me boi jorando, Por me amor, que consorbo lues irda, etc. I am going, going, going far away, For a love which I will keep forever, etc.

is a liberal translation; the patois of these light hearted Spanish is difficult to translate. They were unconscious of my presence at first, but I begged for another picture. In it Carmelita has crowned her lover, and their handsome dark faces are full of laughter. These two photographs are now treasured in their far away Californian home. I shall close my portfolio and my article at the same time, only adding to the latter a truth which the former always speaks. It is sound logic, too; any pursuit of art or science, even by amateurs, need not be unproductive of substantial results, if the workman be earnest and honest, for good work of any kind, pays. Good pictures pay twice over in the pleasure they give, and the use which can be made of them.

PHOTOGRAPHY IN FUTURO.

By the Rev. J. Carter Browne, D. D., England.

So rapid and so marvellous have been the strides of our beautiful art in the past, that it would be presumptuous, if not absolutely impossible to forecast what may and will be done in the by-no-means far future. I go back in thought nearly forty years, when one who was then supposed to be a misguided individual, came into the county town, where I was at school, to take likenesses. Few people at first took much, if any, notice of the new fad, which he was said to have introduced, besides which it was too expensive—if I remember rightly fifteen shillings for a portrait—for most people to dabble in. Many of us knew well, and still possessed the beautiful paintings on ivory of our grandsires, and splendid specimens they were, even if produced at a high cost, of the reproductive art. But here came a man, who in a few minutes, and with a single sitting, professed to give a more perfect likeness than the studied hours had enabled the miniature painter to produce. Our head master, a very high wrangler and third in the Classical Tripos of his year, was happily a scientific man also, and was amongst the first to patronize the new comer, and test his powers. When all was finished, but I cannot at this period of time recall the exact number of sittings that were given, but certainly three or more, we were admitted to an inspection of the result. It was certainly a perfect likeness, but had its drawback in only being properly seen at a somewhat inconvenient angle. Nevertheless the fact was sufficient, and it soon set us boys on the qui vive to make acquaintance with the photographer in order to learn all about it. And then we found that it was produced with a species of camera obscura, the modus operandi being the fuming of a silvered copper plate, without even the utterance of any mystic words to assist the operation. The price, however, was kept up, and as in any branch of science or commerce that takes with the public, improvements soon began to set in. But at present it was declared an impossibility to multiply the pictures; it was a case of one sitting, one result. I leave school and go to Cambridge, where I find that the world is already indebted to Sir John Herschel for the means of taking pictures on glass plates. Collodion and a silver bath were not long in finding their way to the front. Multiplication, if in one other branch of science it has been denominated vexation, is realized as a boon in photography. The art is entrancing. I buy my first camera and lens, and am frequently to be seen at "the Backs" with the professor, as we dubbed the leading photographer of the town, and his boxed-in wheelbarrow. But oh! what a period of stained fingers and spoiled clothes! I draw the curtain, where then I was wont to draw the india rubber cot on those nitrated digits. But happily the wranglers of the new art are at work, and a dry process is introduced to the world. I well remember how I worked at the albumen, the Taupenot, the collodio-albumen, the oxymel, the coffee, the tannin and some half a dozen other preservative methods—and indeed I wrote a pamphlet on them all, the manuscript of which is still on my shelves unpublished, but negatives from almost each of them I still have in my possession, and am not ashamed of. Of all these, perhaps the most beautiful and easy to work was the tannin, and with some dozens of stereoscopic plates thus prepared, I secured negatives in Scotland, Wales and Normandy. But the drawback of the old silver bath and its staining of fingers still remained. And so we plodded along, contented to some extent with the progress that had been made, until some ten or fifteen years ago came the gelatine process and the present dry plates of commerce, and alkaline development versus acid. What a revolution! What a happy change for the better! The work half done for one, and little or no messing to be endured. And

since that time the practice of photography has been going on with even more rapid strides than before, scarce a town or village in England and elsewhere being now without its professional or amateur, amongst whom we hail with pleasure no small a contingent of the gentler sex. Scores and scores of firms working continuously, I might almost say contiguously, at the production of dry plates at home and abroad; large shops and even co-operative stores dealing solely in the necessaries of lenses, cameras and chemicals. What an impetus it has given to trade from the optician and the chemist to the cabinet maker. One element only seemed to be at a standstill; pyro held its own, mindful of the past, regardless of the future; but even this is now severely challenged, and hydroquinone, eikonogen, etc., are fast treading in its track; glass, too, is giving way to flexible rolls and celluloid films; silver printing and gold toning to bromide paper and platino type, to opals and aristo-type, to say nothing of the mechanical printing processes of Woodbury, Zuccato, and the marvellous results of Meisenbach in his Autotypie Verlag at Munich, photogravure, photozincography, etc. Who would have believed a decade or two ago that the year 1889 would have to record over 250 patents taken out entirely in connection with the photographic art? Truly in thirty years or so this is an astonishing progress. What dare we predicate of the next generation? Will it be photography in natural colors? This is one of the few Gordian knots that remain unravelled. So rapid have the plates become that it is an everyday occurrence to meet devotees, nnencumbered by sprawling legs (tripodial not human) and only a natty little despatch looking box, yelept a detective (a far fetched appellation, I trow), taking your likeness whether you will or not, or securing a perfect reproduction of the boisterous wave or the galloping steed. And what next? Who can tell? Who dare say that plates so rapid and developers so energetic will not be found as to enable us to take a portrait by ordinary gas or candle light? The illuminating power of our coal seams is fast giving way to that of the dynamo and carbon points; and if the electric light be as indeed it is, so superior to the jaundiced carburetted hydrogen, what may not the third condition be of our street and studio illumination? Why should not smoky London give way to a smokeless atmosphere? Nay, even the very walls of our studios may ere long be coated with a luminous paint that will obviate all necessity of other illuminating media. And thus we may

confidently look forward from the progress of the past to a development which will be as astonishing to those who shall behold it as the present state of things would be to the eyes of a Nelson in the naval world, or a Daguerre or Niepce in the realm of photography.

LANTERN ENTERTAINMENTS.

By Wm. Chamberlain, Cranford Camera Club.

It is sometimes the custom when giving lantern entertainments to add a few comic slides for the amusement of the young folks present, and as very few such slides are to be found in the photographer's collection, they are hired from a dealer for the occasion. To those who are artistically inclined with the brush and pencil, it is very easy to make copies of comic pictures, which can be found in many illustrated papers, by taking a piece of gelatine paper, cut to lantern plate size, and tracing on that, in India ink, the sketch desired; great care should, however, be exercised to get proper effect by giving the exact expression to the faces. Transparent color can be put on the opposite side so as not to disturb the ink, but do not put on too much water or the gelatine paper will pucker up. Then the paper should be mounted between two glasses for preservation. A suitable mat can be easily cut to any size required, by using the Bain mat shape, which is an indispensable article for all who make slides.

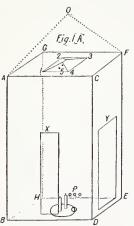
HOME MADE PHOTOGRAPHIC APPLIANCES.

By Horace P. Chandler, Boston.

In nothing more than in photography have I found the truth of the adage, that "necessity is the mother of invention." I believe that any one, boy or girl, man or woman, can learn to use the camera and make a dark room with all its appurtenances. The ingenuity that is thus called into play, is by no means the least benefit to be derived from the use of the camera. I assume in almost every house there is a bathroom, with a set tub. Darken this room (at night the task will be an easy one), and the rest, if not all, nearly all that is needed is there.

You want a lantern. Here is one that you can make yourself,

Fig. 1 A. A stiff cardboard box, A, B, C, D, E, F, G, H. Call the dimensions A to B = 24 inches, A to C = 12 inches, C to F =

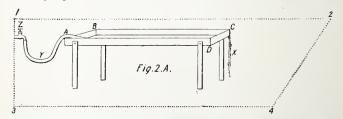


12 inches. 1, 2, 3, 4, is a ventilator. Cut a bit of cardboard about this shape, A. At 5, several holes are made the size of a one-cent piece. At the lower edge, back side, some similar holes, protected on the inside by a bit of card bent at right angles, Fig. 1 B. This is looking from the inside at E, H, Fig. 1 A. By this simple contrivance, the air can pass in at 6, Fig. 1 B, and out at 5, Fig. 1 A, and yet no light to do any harm can escape.

At X and Y, Fig. 1 A, cut out card, and ness of yellow cloth;

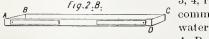
insert double thick-X in my lantern is, say, 4 x 12 inches, and Y is 7 x 12. If too much

light issues, it is a simple thing to cover either X or Y, or both, by leaning a card against the lantern The light is got from one or two common 1/2 length candles set in a tin pie-plate. If red cloth is used in place of yellow, and



more light is needed, a simple reflector can be attached to the tin plate rim.

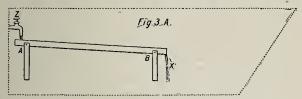
You need a washing tray? I make one thus: Fig. 2 A, 1, 2,



3, 4, represents the outline of a common bath tub; Z, the cold water faucet; Y, a rubber pipe; A, B, C, D, the wooden tray—

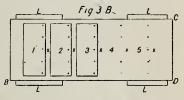
closed at Fig. 2 B, open and in use, Fig. 2 A. The legs turn on

the screw holding them to the side, and shut up against the side, the tray thus taking but little space when not in use. X is the water running off at C, this end being lowered a trifle by shortening



legs, C, D. The dimensions of such a tray would be regulated by the size of plates one used. A simple board and a raised rim

round it, with legs, is the whole story. Fig. 3 A and Fig. 3 B show another form of tray. The dots in Fig. 3 B, representing brass tacks (which will not rust), upon which to lay an edge of the s plate. The water entering



the tray from the rubber pipe, or the faucet direct, falls on the first plate at I, Fig. 3 B, then falls on to plate at 2, and then 3, and so on, falling from the tray at X, Fig. 3 A, after washing all the plates with running water. This tray also has legs that shut up as in Fig. 3 B, at L.

A CRACKED PLATE.

By H. J. Channon, England.

On removing one of my plates, after exposure, from the dark slide, I found that the glass was cracked right across the centre. The film, however, was uninjured, and, as I considered the subject (an instantaneous one) worth the trouble, I decided to try to save the negative and transfer the film to a new glass. Having been perfectly successful in this attempt, an account of my experience may, perhaps, be of some interest to others.

The first thing necessary_was to provide some temporary support, in order to keep the two halves together while developing the negative, and the best way I could hit upon of doing that was to cement_the cracked plate to another, a size larger, with

beeswax, which, being impervious to moisture and easily melted, seemed a suitable material for the purpose. The larger plate was placed on a piece of heated glass, which was kept hot by being placed over a vessel of boiling water. The wax had previously been melted, and a fairly thick film of it was now spread over the surface and the damaged plate gently lowered (back down) on to it, great care being taken to avoid splashing the molten wax on to the film side. On removing from the vessel of hot water, the wax soon set, and the glasses adhered well. The negative was then developed, fixed, thoroughly well washed and dried.

To strengthen the film, I next gave it a coating of a twentygrain solution of gelatine, avoiding too high a temperature and using it rather sparingly, for I have found that the thickness of gelatine sometimes used in film processes is certainly detrimental, if sharpness in printing is desired. This coating of gelatine might, perhaps, have been omitted, but I thought it safer to apply it. When dry, I cut through the film with a sharp knife, along the margin, within about one-sixteenth of an inch from each edge, and then put the plate in soak in a solution containing 120 grains of chrome alum and thirty grains of citric acid in a pint (twenty ounces) of water, and left it about twenty-four hours. After this treatment the plate was well washed, to thoroughly remove the alum, and placed in a dish of water. Then, by a gentle movement of the finger (pressing down and drawing slightly aside, as in turning a leaf of a book with a moist finger) one corner of the film was loosened, raised and turned back, and the whole then slowly but without difficulty detached from the glass, without injury and, owing to the long soaking in the chrome alum solution, without perceptible expansion. It was now only necessary to float the film on to a clean plate, avoiding air bubbles, and, lifting slowly from the dish of water, to drain and dry. The result, a fair negative, was apparently none the worse for the accident, except that a scarcely perceptible hair line could be traced where the crack had been.

Breakages are sometimes very vexatious. I had another experience of this kind some time ago. Having taken a satisfactory negative of a group of friends, who lived at some distance and had returned home, I took a proof from it, far too weakly printed to bear the reducing action of the toning and fixing baths, and a few minutes later the negative had a fall. It was

afterwards found to consist of about twenty pieces. An attempt to repair it with Canada balsam resulted, after wasting much valuable time, in utter failure, and the only chance I then had of saving the picture was the doubtful possibility that a satisfactory negative might be obtained by copying the print which I had taken. To have fixed this would have spoilt it, and it could therefore only be used as it was, still sensitive to light. Having decided to try what could be done, I first thoroughly washed out the free nitrate of silver, then attached the print while wet, to a clear piece of glass, the face being in optical contact with the glass, and made a copy from it in the camera on an ordinary dry plate, shading as much as possible from daylight, except during the time of exposure.

To my surprise, the resulting negative was scarcely inferior to the one which had been broken, and I had the satisfaction of being able to send my friends prints with which they were very pleased. They have never been informed of the disaster which happened, as I feared the knowledge might make them critical.

TO PREVENT NEGATIVES BREAKING IN THE PRINTING FRAME.

By Mrs. Fitzgibbon-Clark, St. Louis Photographer.

There is more or less danger of negatives breaking while under pressure in the printing frame, and just as like as not, it will happen to a valuable one, not easy, or often entirely impossible to duplicate, as was our experience a few months ago. Negative films can be stripped from their glass support, but not every photographer can successfully accomplish the feat. Besides, the film may become broken, as was the case in the negative above referred to.

Now we all know the truth of the old adage, "An ounce of prevention is worth a pound of cure." We must, if we can, prevent the breakage. Some of the plates on the market are on exceedingly thin glass, while others are slightly uneven. Such plates, resting against the hard, unyielding surface of the wood frame, when the strong pressure is brought to bear in order to hold the paper in perfect contact, are more than liable to break; therefore, to prevent such a mishap, take some felting, and cut into strips the width of the projection upon which the nega-

tive rests, and glue them down all round the frame. The felt will give to any slight unevenness in the negative, and prevent its breaking while under pressure. It will take but a few moments to fix over all your frames, and you will be well repaid for all your trouble, and it may be the means of saving you many times the cost.

Manufacturers might take a hint from this suggestion, and give us frames already prepared in this way.

HOW TO HORNSWOGGLE A PRINTING BATH.

By J. R. Clemons, Philadelphia.

You have asked me to contribute an article for the "Interna-TIONAL ANNUAL." I had considerable trouble at first, rummaging through this old caput of mine as to what would be an interesting subject and benefit to your many readers. At last my mind dwelt upon albuminate of silver in the printing bath and my mode of testing the same. I often have heard the remark, "confound it! don't know what has got into my bath; it don't begin to work as it used to." Well, perhaps I can tell you what is the trouble. You have floated too many sheets of paper upon it without replenishing the bath with silver. A sheet of albumen paper lifts more silver from the bath than many are aware of. (See Anthony's International Annual, page 57, 1889, where a full statement will be found regarding the amount of silver taken up; also, the quantity of solution used with one dozen sheets and how to supply its wasted condition.) The bath becomes contaminated as soon as one sheet is laid upon it; and it becomes impossible to make ammonia nitrate of silver from the same solution. When a bath becomes highly charged with albumenate of silver, it will be found to foul every sheet of paper placed upon it. It leaves part of the fresh albumen in the bath and takes up part of the albumenate of silver in exchange, and the aforesaid sheet of paper will not have the same amount of gloss, that it had prior to being placed upon the It will print without much lustre and tones very slowly. It will take more gold on account of the large amount of dirt which came from the bath, and it becomes impossible for the regular amount of gold to penetrate its way through the aforesaid dirt. Printers have stated to me very often, that the paper

they were using would not work as well as when they first received it, when, in fact, the above was the fault. And they would surely lay the blame upon the poor albumenizer. (Oh! I forget, there is no such word in any of the dictionaries that I have consulted, so you can blaze away as there is no such a chap.) I will endeavor to give at first all the preliminaries and then the explanations. In the first place, use glazed dishes that flare out at the top, such as saucers, pie dishes, or any low dish, but it must, as stated before, flare out at the top, or the great heat they will undergo is apt to crack them. In no case use porcelain ware of any kind, unless you want to reduce its size, which the heat will surely do, and will rim it down to the solution's edge neatly as though done with a diamond. (I have reference to evaporating dishes when only partly filled.) It matters not if the silver to be operated with is black, brown, gray, or baldheaded with age or old enough to vote. The explanation to follow, will cure the worst bath that one may be able to trot out. It matters not whether it is a negative or positive. The alcohol in the negative bath (after it is filtered) must be driven out by heat. With the positive allow it to remain. The bath can be neutral or alkali, it is all the same, for it will be acid when you get through; but do not neutralize, as it does no harm. Allow the saucer, or whatever you may employ, to be placed where there is no draft, as the least air will interfere very much; but you can have light to any amount you desire; have it placed so that the sun will not shine upon it, as it will be almost impossible to know whether the alcohol flame is burning or not. Mix together one ounce of the FOUL BATH with one and a quarter ounces of ninety-five per cent. alcohol; place it in a saucer, light or inflame with a match, it soon will begin to curdle and then swirl and gyrate, while the whole solution will twirl and twist about slowly. The intense heat at the top brings every part of the solution to the top, it then becomes coagulated and falls to the bottom, carrying other organic bases with it. If the silver in the commencement was black, it now will be clear, so the bottom of the saucer can be seen distinctly. When it has become cold, filter, then float a small piece of albumen paper upon it; dry it, then compare it with the piece that you tore it from, and the difference between the two pieces will be readily perceived. When you have large quantities to be done my plan is to evaporate the bath down to about one-third of its bulk, then

have a good supply of saucers on hand (have the silver and alcohol already mixed), then fill the saucers nearly full and light them, as stated before. When cold, filter; when finished add water to the filtrate, that it may carry all the silver through. Then again add water to get the proper strength for printing. Shake well and give it sunlight, but do not place it in the sun, as it would take too long a time to get there. The filtrate and the insoluble albumenate of silver should be turned into chloride of silver, for it is a treacherous compound and explodes with a force almost equal to dynamite. Silver renovated by this experiment is a great saving and will pay. The alcohol is the only expensive part. Even that does not cost as much as the extra gold you are compelled to use. Besides, see how much better the prints will look at the finish. In fusing a large and heavily charged bath containing albumen, you do not get rid of all the deleterious matter. Also if you fuse the baths over and over again, and place into solution again by shaking it up, bubbles will form. But with the method above, that I have given a number of years trial, you can agitate the solution to your heart's content, and as soon as brought to rest the bubbles will immediately disappear.

DARK TONES IN SILVER PRINTS.

By E. H. Crowell, Hartford Camera Club.

The beauty of a silver print is greatly enhanced or detracted from by its tone. As a rule, prints from most negatives, show to the best advantage when toned to a rich purplish black in the shadows.

The following toning bath is one that I have used for some time and can recommend alike for its simplicity and the certainty with which these dark tones can be produced.

To begin with, printing is one of the prime factors, and if you want dark tones you *must* print deep in the first place, and, of course, for sepia tones correspondingly lighter.

Another point is always to use freshly silvered paper, either prepared yourself or procured from some professional, in preference to ready sensitized paper.

Make the following and keep as stock solutions:

No. 1.	Chloride gold1	5 grains
	Distilled or ice water	$7\frac{1}{2}$ ounces.
No. 2.	Tungstate soda	1½ ounces
	Distilled or ice water	71% ounces.

Have made for you at any tinner's, a tin pan about an inch larger all around than your toning tray and two inches deep, with two ridges in the bottom about half an inch high.

After trimming, put the prints one by one into a tray of clean water, until you have enough to make a batch, which may vary according to circumstances from eight to twenty, though the latter number is rather more than I like to handle at one time. About twelve 5x7 or 5x8 prints is a good average.

While the prints are soaking prepare the toning bath.

Take one-half ounce of gold solution in your graduate and add sufficient of the tungstate soda solution to thoroughly neutralize it, which will be found by testing with litmus paper.

Put this in your toning tray and add twenty-four ounces of water and a pinch of salt.

Now put the toning tray into the tin pan and fill the pan with hot water. This gradually raises the temperature of the bath and accelerates the chemical action as the strength of the gold decreases.

Rinse the prints once or twice in clean water and then immerse, one by one, in the toning bath. Keep them moving, turning them over occasionally for examination, until they are sufficiently toned, that is quite blue, as they lose much of their bluish cast in the hypo.

I have found that it doesn't pay to hurry your prints through a strong bath, as they merely tone on the surface, and in the hypo will return to their original red color. As the prints arrive at the proper stage, throw them into a tray of clean water. When all are toned, rinse them thoroughly in a couple of changes of water and then treat them to a bath of salt and water in the proportion of about a teaspoonful to a quart. Leave them here for a few minutes and rinse again and immerse in the hypo.

I use a hypo bath of four ounces of a saturated solution to about sixteen ounces of water. Let them remain in the hypo for about twenty minutes, stirring them occasionally, after which, wash them for three or four hours, either in running water, or in ten or twelve changes in a tray. Pour your toning bath into a large bottle or other suitable receptacle, and keep it in the dark;

it improves with age and can be used repeatedly as long as it remains clear.

Each time it is used, add the requisite amount of gold neutralized with tungstate soda and proceed as before.

SOME OF MY EXPERIENCES.

By Geo. E. Davenport, President Mystic Camera Club.

There is no good reason why the writer's experiences should be of any greater consequence than the experiences of any other amateur, and he wishes it to be distinctly understood that he does not claim for them any special significance.

They are, at the most, valuable only in so far as they contribute toward the summing up of general results.

The component parts of every whole are made up of isolated experiences, brought together and winnowed of their chaff. Such are the "mosaics" of all branches of human knowledge, toward the completeness of which the experiences of the humblest worker may be indispensable.

It is this truism which gives value to thought interchanges and comparative experiments, and makes any apology for my own humble contribution unnecessary.

My experience in photography dates from August, 1883, when I was led into it through the desire to aid a distant friend—unfavorably situated for personal investigation—in obtaining an outfit, and soon after was unexpectedly presented with one by him for my own use. This outfit, although I have added to it since, has been and is a constant reminder of his friendship and generosity, making it impossible for me ever to forget, even if I otherwise could, the delightful two weeks passed with him in the beautiful town of Charlotte, in the charming valley of Lake Champlain, in the wonderful region of Smuggler's Notch, among the green mountains of Vermont, and our mutual endeavors to make ourselves familiar with the use of the camera.

Do I not still remember the sensation with which I tried to steady our camera on the projecting edge of rock high up on the rough cliffs of Sterling Mountain, with no room for our tripod, and barely foot room on which to balance ourselves! How dizzy my head seemed as I paused a moment to look downward on the tree tops far below, till the timely caution of my

well trained friend steadied my hands, and enabled us to secure, in spite of the strong wind, a view of the cliffs on Mount Mansfield and the opening through the Sterling Gap in the Notch! And so finding myself well equipped on my return, it was not long before this fascinating pursuit began to exert its potent influence over me in earnest, leading me on and on, only to find that the further I endeavored to go into the ever expanding field of photographic work, the less I seemed to know, and the more chary I became in venturing to give advice where I felt so keenly my own deficiencies and need for knowledge.

One occasionally meets with amateurs who have succeeded in mastering all the intricate complications of the photographic art in the course of a few weeks, and who, with the assumption born of self conceit, are ready to "give points" even to those who have made photography a life study. But it is pretty nearly safe always to assume that such have everything to learn. The old adage that a "fool is wise in his own conceit" oftentimes receives forceful exemplification in this as in all other pursuits.

A certain amount of modesty is becoming to the best, and if one only starts in with a generous amount of it, he will come to appreciate its value more and more as he goes on, and never wholly abandon it.

It is never a good plan to assert anything too confidently, but always only to suggest. If, however, I should venture to assert as the outcome from my experience, any one thing as being an undeniable truth always to be remembered, it would be that the one indispensable essential to all successful work is a certain modicum of brains.

With a liberal proportion of this most valuable ingredient one will come gradually to see the absurdity of all iron clad formulas that are meted out with so much exactitude and care.

Whenever I read a formula calling for just so many grains, or minims, neither more nor less, I cannot help thinking that it could not possibly do any harm to add a few grains of common sense.

In my own practice I keep constantly on hand for developing separate stock solutions of hydroquinone, eikonogen—these in small quantities, and always with sulphite—sulphite of soda, carbonate of soda, carbonate of potash, caustic potash for occasional use only, bromide of potassium, and hypo. These I use in every conceivable manner, and with an utter disregard to

proportions, which are varied to suit the conditions under which I may be working.

I do not mean to assert by this that there is nothing absolute. There are certain essentials that are always true, certain facts from experience that other experiences render certain; but it is not to be denied that the science of developing, admits of the most astonishing latitude, and that as plates are now made*, it does not matter much, so far as results are concerned, whether one uses iron, pyro., hydro., or eiko., nor just exactly what the proportions may be. Equally good negatives have been made from all of these agents while working with widely different formulas, and one may safely choose that method which, after careful trial, suits him best.

For myself I have given up the use of iron and pyro. for hydro, and eiko., not because I could not get satisfactory results from the first named, but because of the greater cleanliness of the latter, and the greater latitude one has through their use in exposing and developing.

Hydroquinone has been accused of being poisonous, but this has been denied by its manufacturers, and the complaints about its making the hands sore, which at one time were prevalent, were in all probability due to the caustic alkalies used in commercial developers. In my own practice I seldom use a caustic alkali, but almost always the carbonates. Meta-bisulphite of soda is said to be not only a better preservative of hydro. in solution than sulphite, but to give a better color to the negative, and red prussiate of potash is said by Muller to quicken its activity wonderfully.

Eikonogen, we are told, is perfectly harmless in its nature, and that is so much in its favor over pyro., which is of so poisonous a nature that there is no known antidote for it.

But that is not the only recommendation that eikonogen has. I have used it continually since it was first introduced, without its once showing any disposition to fog or stain either my plates or my hands, and have not once experienced the dizziness and discomfort about the head which I used at times to have when working too long and intently over my tray with pyro development. As an instance of its wonderful energy, while develop-

^{*}It has been stated that the Cramer plate will not work well with Hydroquinone development, but that is my favorite all round plate, and I have never had any difficulty in developing it with Hydroquinone.

ing with hydro., some old plates exposed quickly indoors on a dull day, finding after half an hour's time no, trace of an image appearing, I added to my developer enough of my eiko. solution No. 1 (six grains to ounce) to give me three grains of eiko. when almost immediately the image made its appearance and gradually developed to a point where, although very much undertimed, I could, by careful intensification, get a very fair print.

Mr. Henry J. Newton is reported as saying that hydro. without sulphite of soda is quicker than eiko., but as the formula which he gives contains three grains of eiko. to two of hydro., it looks as if the greater energy of which he speaks must come from the former. One thing, however, is certain—the two agents work together splendidly, the combination not only producing softer negatives, but retaining its energy and clearness longer as a stock solution, even after repeated and prolonged use.

I have experienced more pleasure in developing with these two agents than I ever did before, and I am not likely to return to the old developers very soon.

So far as there is any particular choice between the two agents, I prefer the hydro for all time exposures, as, with its use the question of time is not of so much importance. One can safely give much more time than may be actually necessary, and rely upon this careful agent to model out the image properly.

But for very quick exposures I prefer the eiko. or its combination with hydro. The quickest form of the eiko. which I have used I made by adding one dr. of an eighteen grain solution of caustic potash, to two ounces of eiko. solution containing six grains of eiko. and twelve grains sulphite to the ounce, and I suppose that without the sulphite it would work still more quickly.

I do not understand how any one can say that eikonogen produces chemical fog; I have not met with anything of the kind as yet in my own experience, and nothing has given me greater surprise than to hear an expert Boston amateur make such an assertion, unless it be the further extraordinary statement, that some one else had succeeded in overcoming the fog by using a large quantity of caustic soda and then counteracting by a liberal use of bromide!

We have been told that ammonia was the only chemical in-

jurious to eikonogen and cautioned to keep the two apart; but it has been shown that the two work well together, and I have found that the slightest trace of pyro. will not only discolor eiko. in solution, rendering it thick and muddy in a very short time, but utterly destroy its working energy so that it becomes wholly unfit for use.

The somewhat stereotyped advice to amateurs to stick to one plate and developer is all very well so far as it goes, and for beginners; but as soon as one feels competent to do so, it will be better to get used to handling different plates and developers, as by so doing one broadens his comprehension of photographic difficulties and is able to cope with them more intelligently.

The worker in a rut is always at a disadvantage when meeting with some unexpected difficulty, which the freer methods of one not hampered by routine work would be likely to find some way of overcoming. The first, can have only a very narrow range of vision through his restricted limitations, while to the latter the broadening field of work seems ever new, with its continual revelations of new expedients, new methods, and oftentimes new discoveries.

It has been said that there is nothing original—nothing new—that what appears so is only a rivival of something that has been before, or merely a new application of old principles. However this may be, there have been some striking exemplifications of its apparent truth in my own experience that throw doubt over many socalled originalities.

Thus an item in the photographic column of a daily paper, recently stated that an acute amateur had discovered that hydro, and eiko, worked well together, a fact which I could very well believe, as I had been using such a combination for some time.

A similar statement soon after made its appearance in another quarter, and the fact probably is, that other amateurs also found out the same thing, but it is none the less certain to my mind that the combination would not have suggested itself to any one not accustomed to work in the free manner which I have described.

Again, once when my toning bath refused to act with its usual promptness, I made some experiments, which resulted in a combination bath, which I have used successfully ever since. But the singular part of it was that I afterward learned from a

professional friend, to whom I mentioned it, that I had stumbled upon a secret formula of a well known photographer, with a national reputation. Subsequently a similar combination was recommended by a writer in a British journal, all of which goes to prove that similar ideas will suggest themselves at the same or different times without any collusion whatever.

During my experience I have tried nearly every make of plates and, with one or two exceptions, have had very good success with them all. I believe that all reliable makers now turn out good plates. Occasionally some emulsion may go wrong, but as a rule, now there is very little risk in selecting plates. Sometimes one can work some particular brand better than he can another, and that will determine his choice. For, if one finds, or thinks he finds some special quality in one plate that is apparently wanting in another, he will, of course, choose that plate in preference to all others.

My first plates were the Eastman instantaneous, with which I never had any trouble that I could not trace to some fault of my own. Eastman specials always worked satisfactorily with me. Following these I used the Allen & Rowell old instantaneous for two years, and found them of uniform reliability. They were the only plates of that time that were properly packed, and I have not found any plates since to surpass them in the fine printing quality of the negatives they yielded.

I have had equally good success with the Carbutt, Harvard and Seed plates, all of which yield rich negatives, with superb printing qualities. The fine character of the Carbutt B plates is well known. Probably no other plate has held for so long a time, so well merited a reputation as this plate, which is the "ne plus ultra" of slow plates.

For speedy plates the old St. Louis surpassed any plate I ever used, proving equal to nearly every demand made upon it, while the hardness of its film enabled me to carry it through the most prolonged development and washing without frilling. When the manufacture of this plate ceased, I felt as if I had lost a dear friend.

I now use in its place the Cramer, which, with any number above 35, is the most rapid of all plates.

I have but little faith in the value of sensitometer numbers as' published. I used to find Seed 19 quicker than Carbutt 20, and the old Cramer Lightning quicker than any plate, registered 25.

I now find the Cramer 35, which I sometimes think is just as quick as the 40, quicker than any other plate registered 40.

Such extremely sensitive plates, however, do not seem to be necessary unless one has a slow acting lens and feels obliged to take extreme chances in trying to get something unattainable in any other way.

With a Dallmeyer, Ross, Beck, Euryscope, or any other quickacting lens, almost any well lit subject is liable to be too much over exposed on such plates, unless the lens is well stopped down.

With an 8x10 Dallmeyer rapid rectilinear lens, stopped down to its smallest stop, I had some seascapes taken on Cramer 40 plates with a quick drop, on a dull day, hopelessly over exposed.

I believe it, therefore, better for one using any of the extra rapid lenses to use slower plates, and for all general work, where there is no motion to overcome, slow plates with generous time exposures will yield the best results.

I never could bring myself to like the paper negatives, although I had fairly good success with some of them, and was about to try the stripping films when I saw some of the Allen & Rowell ivory films and tried them instead. I was so well pleased with them that I should have used them oftener but for their greater cost. I found them to be as easily handled as glass plates, for which they are a good substitute, while they serve the double purpose of a negative and transparency.

The later films of Carbutt, Eastman and Seed I have not yet tried, though I intend doing so. I have great faith in the future for celluloid films, and believe that if their cost could be brought down anywhere near that of glass, they would gradually come into more general use. The positive films are especially beautiful, and nothing can surpass the exquisite artistic effects produced with them.

Recently I have been trying orthochromatic plates, but mostly for landscape work and without a screen, which may account for my not having as yet obtained perfectly satisfactory results. I have, however, found in using the Vogel Eosine plates that they are not so sensitive as the circulars claim them to be, and it was not until I began to give generous exposures that I became at all successful with them. Given plenty of time they yield most beautiful results. The Carbutt color-sensitive plates appear to be much quicker. I have also found that

It is quite possible to dispense with the ruby light in developing color plates, having succeeded in developing both the Carbutt and Vogel plates by the same light with which I develop all of my plates—a pale green obtained by combining double thick dark green with deep orange.

But the most fascinating of all photographic work, it seems to me, is the making of lantern slides. During the winter months now closing, some of the members of the Mystic Camera Club took up this branch of work and acquitted themselves most creditably. Mr. A. F. Boardman and W. C. Upham made some very beautiful slides, which were made wholly by reduction and developed with a hydro. developer prepared with meta-bisulphite of soda, the resulting slides being very soft and fine. Mr. Eugene E. Sweeney and Geo. L. Stone also made some fine slides, both by reduction and contact, developing both with hydro. and eiko. E. Lawrence Jenkins and Mr. E. A. Bean also made some fine slides and the writer made a few by contact only, developing with eiko., or eiko. and hydro. combined.

It has given me much pleasure to see the accumulating evidences of a revival of stereoscopic work. I suppose that I have been almost the only one in the vicinity of Boston to do anything in that direction during the past five years, but it begins to look as if I should have plenty of company before that period of time passes again.

Believing in one's being able to do his own work all the way through, at least so far as time will permit, I have, even in my limited occasional spare time, silvered my own paper, using the plain silver bath of fifty grains to ounce, fuming twenty minutes and toning out my prints with a combination bath which I prepare by taking a pint of soft, boiled or distilled water, adding sufficient gold, be it more or less, to turn a piece of blue litmus paper to a very decided red, and then neutralizing with equal parts of saturated solutions of carbonate of soda and powdered borax. To this I occasionally add two or three drops of a ten per cent. solution of chloride of lime, which gives deeper tones. This bath keeps almost indefinitely, my present bath has been made over a year, and works better after the first time, needing only the addition of a little gold or alkali as the case may be.

With bromide paper I have had very good success when using iron or eiko. development, but now use the latter altogether, as I find that it is less troublesome, gives equally as pure whites, admits of shorter exposures, and is kept under better control.

But I have already carried this paper beyond a reasonable length, and will close by giving some of my formulas as I prepare them. My use of them, however, is another matter. If any care to try them they must bear in mind that I am governed wholly by whatever conditions I may be working under and vary my proportions as those conditions may seem to require.

It is as if one was given a certain complement of tools and told that such or such a piece of work could be done with them; unquestionably the tools might be well adapted to the work specified, but it would altogether depend upon the manner in which the tools were used, whether or not the work was done as it should be.

In the first place I put one pound each of carbonate of soda, carbonate of potash, sulphite of soda and hypo. into separate wide mouth glass jars holding two quarts and fill them up with water—of course the purer the better—so that when full I have stock solutions, each four ounces of which, holds in solution one ounce of the chemical. My hypo. I keep and use this strength for fixing plates, and when I want to fix prints I dilute whatever quantity I may need, one-half with water, making it one in eight. I keep a separate stock solution of sulphite, so that I may always have it on hand for use in various ways. Sometimes I add it to my hypo. in the proportion of about one-third, and when using it for refixing, after intensification, I dilute it to about one in ten.

When using pyro, I used to take two ounces each of the carbonates and sulphite and make a working solution of forty ounces, adding my pyro dry. This was my normal working developer, containing twelve grains of alkali to from three to six grains of pyro. in each ounce of developer, and could be altered in either direction to meet emergencies.

Since giving up pyro, I keep my alkali solutions as before, with the addition of an eighteen grain to the ounce solution of caustic potash for occasional use, and make up a stock solution of hydro. containing twelve grains of hydro. and seventy-two grains sulphite to each ounce (this should be dissolved in *hot* water) and one of eiko. containing six grains of eiko. and twenty-four of sulphite to each ounce.

These constitute the basis of my working developers. For normal strength if using hydro. I take two drams of stock solution, to each ounce of developer, making up my developer to the proportion of three grains of hydro. in each ounce, adding alkali to give twelve grains to each ounce, and varying as required.

With eiko. I take one ounce of stock solution, which is made working strength, add twelve to fifteen grains alkali and make up to two ounces with water.

The two combine in any proportion, and for very quick exposures, six grains of eiko. with three to six grains of caustic potash in each ounce of developer will bring out an image, if there is anything to come out.

MEDFORD, Mass., U. S. A.

SOME HINTS ON LANTERN SLIDE MAKING.

By Vernon L. Davey, East Orange, N. J.

When traveling, a very long focus lens is of great use, as it permits one to secure negatives of distant objects, which it might be impossible to approach near enough for the use of a short focus lens to advantage.

Clear skies cannot be obtained without dense negatives.

Better positives can usually be obtained by copying the negatives in a reducing camera than by contact. My reducing camera consists of a board, supporting on one end a 5x8 camera, on the other, a box, open at the end toward the camera and arranged with kits at the other end to accommodate any size from $3\frac{1}{4}x4\frac{1}{4}$ to $6\frac{1}{4}x8\frac{1}{4}$. The camera is held in position on the board by a series of blocks, which permit it to be moved near the box when a short focus lens is used in reducing large negatives, or farther from it if using a lens of long focus. A focussing cloth is thrown over the open space between the box and camera. This excludes cross rays and permits the capping and uncapping of the lens. One end of the board is supported by the head of the tripod, merely resting on it and against the projecting screw. The other end rests on the top of the upper window sash, which is lowered to the proper level. It is simply necessary to choose an upper story window not in the sunshine and in front of which there are no tall trees or buildings. A double holder is fitted with kits to carry the lantern slide plates.

A cloudy or even rainy day permits the making of slides as good as those made with a strong light. It is only necessary to use a much larger stop, or a longer exposure, or both.

With the oxalate developer, my experience leads me to use a strong developer with short exposure, while with hydrochinon, a little longer exposure, with weak developer, has yielded the best results.

All plates spoiled in developing may be eleaned and used as covering glasses, if soaked a few hours in a solution of two ounces bichromate of potash in twenty-four ounces of water, to which has been slowly added 2½ ounces of commercial sulphuric acid.

In copying photographs indoors for slides, I have mounted the prints on a board near a south window and reflected a strong light on them by hanging a sheet in the direct sunlight. Without the strong light it is difficult to secure strong negatives, unless intensification is resorted to, especially if the prints are soft and free from high lights.

A FEW NOTES ON DEVELOPMENT.

By Abm. M. DeSilva, New Haven, Conn.

"What plates do you use; what developer?" On showing prints or negatives, these are the very first questions that have been put to me time and time again.

Answering here: A more miscellaneous lot of plates it could not fall to the lot of any one to use.

Under the skylight, given a good plate, it is now a comparatively easy matter for a skillful operator to produce good negatives as a rule; but where one has to do a great variety of work it is an altogether different thing, and it is not only necessary that one should, if possible, select the plate best adapted to the subject, but to modify the developer and make every effort to use it in any way that will bring about the best results; so that really there can be no settled formula. One plate requires coaxing, another a strong push, as it were, at the start; the worst being those poor in silver, in which you can obtain neither detail nor vigor, for without the necessary material you can do nothing. These are best thrown away. Some, the developer permeates readily; others, it takes considerable time for it to act upon, in which case many plates are spoiled by adding considerable doses of alkali under the impression that the exposure has been too brief, producing muddiness and flatness. One gives

dense images with a small quantity of pyro, while the other requires a larger amount of both pyro and bromide. One loses very little density in the hypo; the other (notably those containing iodide of silver) requires to be developed till it is exceedingly dense. Some plates will stand a prolonged development and the developer remain bright (if you handle it properly) for a very long time. Rest assured that has been a carefully prepared and well-washed emulsion. For others, even for a comparatively short development, I have been obliged to mix two or more batches of developer in order to bring out the image successfully, so much gelatine being dissolved in it that it was impossible to keep it evenly on the plate. Once in a while, comparatively rare now, you come across an emulsion in which an excess of silver has been left. Here, of course, a bright metallic deposit covers the whole plate.

A very useful way, and one that once having tried you will not readily give up, is to have a dish of clean water by the side of you when developing. Start the image gently, if you are in doubt, then place the plate into the tray of water, and as the reduction goes on slowly it will give you an opportunity of making up your mind what further to do. If undertimed, let it rest awhile, again immerse it in the developer, then in the water, and so on, and you will find that what would otherwise be a hard negative, lacking detail, will turn out soft and nice. Beside, as I believe it does, other than washing off the partly spent developer from the surface, it enables you to work out little bits of detail in the darker parts without fear of abrupt lines, for, as you pour a small quantity of developer on to these places in your developing tray the water on the film gradually lessens its power of action toward the edge of the pool. And so you can go on for ever so long (every once in a while returning the plate to the dish of water) until you have accomplished what you want. Films which have a tendency to veiling and thinness do not do well under this treatment unless sufficient time has been given to admit of a preliminary soaking in a weak solution of bromide of potassium in water. Short time and a normal developer from the outset being the best for those.

A great many photographers (both old and new) are afraid of or indifferent about bromides. I think it's "one of the best things ever invented;" I don't know what I should do without it. I scarcely ever develop a plate without it—more or less. Fine quality in a negative requires the exposure to be on the right side, and that is—long enough. I am fond of comparatively long exposures for landscapes, giving the plates (except in the case of interiors, and then I am very careful to have a plate that will not readily solarize) a preliminary bath of bromide—sometimes as much as half a dram of potassium bromide in twelve ounces of water; carrying it over into the developer without washing. Your negative will be clean, soft, satisfactory; the blurring not nearly so bad, and, should the separators between the plates give trouble, the markings will frequently be avoided (provided you do not use too strong a developer); at any rate, not nearly so pronounced. Beside, on the "blazing" days we have occasionally during the heated term, this preliminary bath of bromide will brighten up things for you, enabling you to produce results which without it, you could not otherwise obtain.

There are times when much-used developer is useful, but not at the start. Films submitted to a long soaking in old developer ("just to see how they come"), rarely possess satisfactory printing qualities; they are sandy, slow printers, the darks lacking transparency, the tone low, with a total absence of anything like a high light. A little used developer added to a new mixture acts beneficially at times. It is false economy to attempt development with too small a quantity; enough to cover the plate comfortably with an easy sweep being required, bearing in mind that should it be dashed on, the place it first struck will be a thinner one on the film.

More plates are spoiled through using an unsafe light than the plate-exposers are aware of. A very bright light may be used while the plates are placed in the holders, if exposed and developed immediately; left for even a day they would be hopelessly fogged. Indeed, it is advisable in order to produce the brightest and best effects—to get "snap" and quality—to develop the plates as soon after exposing as possible, more or less light being diffused in the camera during the exposure. Unless you can see what you are about, it is impossible to develop the image properly. Where the plates have to be kept some time between the operations, a very safe light is required, otherwise the continuing action of the weak actinic rays goes on, and disappointment will surely follow.

Taking it altogether, considering the vast quantities made, I think the plate makers do wonderfully well, and that our fail-

ures count no more than with the old "wet" process (and it is now over thirty years since I developed my first collodion negatives, both dry and wet,) and will be less as we learn better how to use the gelatine plates; although I do think that now and then they quietly ship to "parts unknown" for sale in small lots, plates they would not themselves dare to "demonstrate" with.

EIKONOGEN.

By P. C. Duchochois, New York.

Eikonogen, discovered in England by an English chemist and patented in Germany by a German doctor who did not find it, is certainly a valuable addition to our list of reducing agents. Its action is unlike that of pyrogallol or hydroquinone, developing the luminous impression at once—as ferrous sulphate in the wet collodion process—giving to the inexperienced the impression that the photo film has been shortly exposed. It yields, at first, a weak image which then intensifies slowly. I have found that when the details are well out, the addition of a small quantity of pyrogallol, say 1 or 1½ grains to the ounce of the developer, is quite beneficial, causing a rapid intensification which increases the contrasts without blocking up the half lights in the lights and therefore imparting vigor and brilliancy to the picture.

The defect I find in eikonogen after six months experience is that we—I should say I—cannot control the development as well as with pyrogallol, which, on the whole, according to my way of thinking, is the best developer, and, as shown by the small quantity of alkali necessary to exact its reducing action, is the most energetic. But not every one has tested its capacity, hence now, the predilection for eikonogen which requires little care to use. It is all the rage amongst amateurs; negatives, transparencies, bromide prints, everything is developed by its agency.

Hundreds of formulæ are published. I will not add one more to the already too long list. I will simply state that it is advisable for short exposures to first soak the film for one minute or so before developing in a separate solution of alkali and sulphite, which can be used over and over again, and that in order to derive from eikonogen all the possible benefit, one should compound the solution with a full dose of it and of the alkali, say two per cent. of eikonogen, three per cent. of potassium carbonate and the usual percentage of sodium sulphite, pure or nearly so. The commercial article contains sometimes as much as ten per cent. of sodium carbonate which should be neutralized with sulphurons acid only. The reason is obvious.

It is an error to think that eikonogen does not stain gelatine yellow. This stain occurs even during the fixing unless care be taken to well rinse the film beforehand. And this is not always a sure preventive for local stains, because the entire elimination of the salt is not possible in the period allowable between developing and fixing. When the stains are formed as stated above, the ordinary clearing solution being unable to remove them, the treatment by aqua regia recommended by Professor A. H. Elliott, in the Bulletin, for February 22d, 1890, page 98, should be resorted to—no stain resists it—or the plate should be immersed for a certain period before fixing in a solution of hydrochloric acid 1:120, to which is added for use a little sodium sulphite.

About fixing I have a remark to make. Within a few months it has been advised to fix in an acid sulphite solution, as it is termed, that is in a solution compounded with sodium disulphite as devised years ago by Mr. Berkeley. This process is good no doubt. It clears somewhat the picture and imparts printing qualities to the negative. But it has a drawback—the object of this remark—that of rendering the reduction of the intensity difficult, owing to the sulphuration of the metallic silver of which the image is formed. The difficulty can be overcome, as the reader knows, but it is troublesome.

With regard to the keeping quality of eikonogen, it is all that can be desired. I have kept, during the Winter, ready made solutions, plain or with the addition of pyrogallol, which still work well.

SOCIETIES AND CLUBS.

By Harry T. Duffield, Secretary of the New York Camera Club.

Nowadays a distinction is made between a society and a club; a society is generally considered as an organization formed for a certain purpose, which meets only at stated times to hear papers read and discuss them, at a place engaged only for the time of the meeting; while a club, on the other hand, pays more attention to the providing of suitable quarters, either rooms or a

house, for the constant use of its members, and though it holds meetings similar to those of the society, they are not considered the chief object for which the club was formed. Those photographers, especially amateurs, who intend forming associations, should determine at the outset whether it shall be of the nature of a society or a club, for it is often difficult, after the association has been in existence for a number of years, to reorganize it.

For an association of amateur photographers it is the opinion of the writer that the club system is the best. Amateurs may be divided into three classes—proficients, semi-proficients, and novices, "baked," "half baked" and "dough." The society plan will not meet the wants of all of these three, as meetings are its chief end. To attract the members to these meetings papers must be read and discussed. If the papers are "highly scientific" they are way over the heads of the novices, partially interesting to the semi-proficients, and interesting only to the proficients; if "elementary" the order is reversed, excepting that they are wearisome to the proficients. As it is impossible to please all, amateur photographic societies generally lead a half alive existence, unless they are clubs masquerading under another designation.

In the case of a club, its first step after organization is to provide suitable apartments for its members, and these alone are often sufficient attractions for its members. In them the three classes meet on a common ground, for all can make use of the sitting rooms, library, working rooms—the working rooms alone often compensating a member for what he pays as annual dues. If the meetings have no attractions for him, he can attend or stay away if he pleases and yet not feel that he is paying his money for nothing. He has a place to bring friends to if he chooses and a place to store his apparatus. If he needs instruction on some knotty point in developing his negatives, toning his prints, or doing other things photographic, he will most generally find at the rooms of the club some other member who may be able to untie the knot for him. The idea that he has a place to go to when he wishes and when there to do as he pleases (under certain restrictions, which he acknowledges to be necessary and not irksome to observe) is a pleasant one to him.

Of course, there is a difference in the cost of running a club and of a society, but the club plan is very popular with men, and the probabilities are that it will always have more members than a society. It is said that in New York city the bonds issued by a club are easily placed, as they are considered good investments by those who make a business of loaning money. Besides, persons will often join a club whose corner stone is a special object—literary, scientific, artistic, athletic—for which they do not care a rap, simply because they have friends among members. A club formed for a certain purpose, which is a popular one, rarely proves a failure.

We will suppose the amateur photographers to have organized themselves into a club. The first thing for them to do is to find suitable apartments, and if the funds, or prospective funds, warrant it, two floors of a building be hired, if a whole house is much beyond their views. The lower floor will be for social purposes and the upper one for the working rooms. The dark room should be carefully constructed as regards ventilation—too often neglected—and have an abundant supply of water, and be divided into stalls. The dark room of the New York Camera Club, probably the best one in this country, has no door to it, is perfectly safe to work in, and thoroughly ventilated; it is divided into stalls, and several members can use it at the same time without interfering with each other. Lockers for the storing of the members' apparatus are placed on the upper floor, where also will be the enlarging and reducing camera, the printing room, closets for chemicals, etc.

It is advisable to arrange the lower floor solely for social purposes, and it may be divided into separate rooms by folding doors, constituting a sitting room, library, smoking room, and by throwing the doors back make one large room of it, for meetings, optical lantern exhibitions, and entertainments. Optical lantern exhibitions are very attractive entertainments, and should be often given, and if they are "illustrated lectures" so much the better. An optical lantern should be one of the first things purchased, and if a club has only a limited amount of money to expend in fitting up its apartments, it will do wisely in purchasing plain and decent furniture and a first rate lantern, for the lantern will do more towards the success of the club than elegant furnishings. But it may be said, "we have no lantern slide makers among our members," to which we reply, "Let the club supply the dry plates, set four or five members to making slides, give an exhibition to members only if the slides are not good ones, and you soon will have your other members enthusiastically engaged in the charming work of making lantern slides." Exhibitions of prints, concerts and similar entertainments should be often given; in fact, everything done to make the rooms socially attractive to the members. Of course, the having of scientific meetings should not be neglected, and at least two papers be read—one of the "highly scientific" grade and the other adapted to the mental wants of the semi-proficients and novices. The discussions on scientific points at the meetings of the ordinary amateur photographic clubs or societies are generally "fizzles," and too often are not worth the paper used in reporting them.

The officers of a club are to be selected for ability to run the club, and not for their knowledge of the art of photography, as it is their business to look after the welfare of the club. Members may be photographers or not; if persons who are not photographers are willing to join the club for the sake of frequenting the rooms, attending exhibitions, entertainments and concerts, well and good; but they should never be in the majority and so have a chance to change the character of the club, and they should pay the same dues as the other members. As it is to be supposed that the male members of the club are gentlemen, and will respect the presence of ladies, there is no reason why women should not be members of the club. The ladies are often among the most efficient members of a club or society, and as the hours they visit the club's rooms are during the daytime, when the men are engaged in business pursuits, they do not interfere with the comforts of the men. In many cases ladies are required to pay only half dues and no initiation fees, and in associations which includes them among their members they are noted for being the most prompt in paying their dues.

HOW TO MAKE A TRANSPARENCY FOR COPYING.

By Edward Dunmore, England.

I am once more reminded of the flight of time by the Editor's request for something for his useful little Annual. As enlargements are attracting considerable attention at the present time, the means of making a suitable transparency will, perhaps be acceptable. If a transparency be required of the very highest possible quality there is no plan of making it equal to the

carbon process. This, of course, is a contact printing method, and requires no particular directions. A good print of medium depth on transparency tissue, on glass free from stain and defects, comprises the whole thing. Many photographers are, however, not acquainted with the carbon process, and make their transparencies on gelatine dry plates. In the selection of the plates rather slow ones are preferable, slow emulsions being finer in the grain and more easily manipulated than those of very rapid quality, especially if the positive is to be made by contact printing. The precautions necessary to secure success are as follows: Firstly—Flat glass, both of the negative to be copied and the plate to be used, for if the plates are at all curved there will be sure to be loss of definition on some portion of the image, no matter what pressure is applied. Secondly—The light should be filtered through ground glass. Thirdly-Every part not required for reproduction must be masked off by opaque paper. An ordinary pressure frame being used, the usual plate glass should be ground on the outside, the negative placed in it and the sensitive plate superimposed; a suitable mask of opaque paper being placed between the negative and the glass of the printing frame, a pad of black velvet laid on them; the frame is then closed and carefully covered from the light until such time that the exposure is to be made. The time of exposure will, of course, depend on the density of the negative and the rapidity of the plate. Artificial light is preferable to daylight. At a distance of eighteen inches from a No. 4 Bray burner. with the usual house-gas, a half minute exposure is an average one, but the proper time must be ascertained by actual experiment. The transparency being developed, should it be found to be a thoroughly exposed one, any undertiming is fatal to good results. The image must not be very dense, or very clear in the shadows, but of an opposite quality to transparencies required for the optical lantern. A thin, plucky positive, fully exposed, is a necessity; get this and you have all you require for purposes of enlargement; without these qualities your enlargement or reproduction will be either harsh or flat. Supposing we have to make the transparency in the camera, all light except that forming the image must be carefully screened off and the negative lighted by reflected light. I have found a large sheet of white cardboard set at an angle of about forty-five degrees, with respect to the negative, as good as anything. The



Pilgrims from Mecca.



cardboard must be considerably larger than the negative, and the image must be examined on the focussing screen to ascertain that the illumination is even, and that the light is reflected from the white surface over the whole area of the negative. Daylight is preferable for this work and an ordinary skylight all that is required. The development is best either with ferrous oxalate, or ammonia and pyro. Soda development is apt to give a yellow image that may be unexceptionable for silver printing but a disadvantage in copying.

EIKONOGEN FOR LANTERN SLIDES.

By Professor Charles Ehrmann, Chatauqua School of Photography.

The eikonogen developer at times leads the operator to adopt methods of working, quite abnormal, perhaps, from those generally followed, but producing ultimately highly satisfactory results. All practitioners have admitted that for diapositives on gelatine emulsion plates, especially when they are to be projected on the screen by the optical lantern, the newly introduced developing agent is productive of exceedingly fine tones, and by modifying the composition of the solution, and variations in the time of exposure, of a variety of tones, warmer or colder.

While employed to make a large number of lantern slides from 8x10 negatives, over exposed in the majority, and of enormous intensity throughout, it appeared to be almost impossible to obtain by ordinary means, results from them, that could be termed approximately satisfactory. When by long exposure and the usual method of developing, details in the lights were visible, the foliage or other dark portions were so extremely intense that all details had vanished, and when foliage had been correctly exposed and developed, the light parts presented nothing but a blank. Finally, a method was adopted that carried me over all difficulties and by which slides of wanted quality were obtained.

The plates used were Carbutt's, and in exceptional cases those made by the Eastman Co., the objective a 5x8 Gundlach rapid rectigraph stop F-32, the camera pointed directly towards the sky. From three to four and five minutes exposure was given to some of these cast iron negatives, and they were developed with the

following solution, either in its concentrated state or when diluted with an equal bulk of water:

Eikonogen	30 grms.
Cryst. neutral sulphite sodium	$100 \mathrm{\ grms}$.
Carbonáte potassium	$30~{ m grms}$.
Water : 1	000 c. c

Dissolved with the aid of heat, in the order given, filtered and kept in well closed bottles. The developer applied to these seemingly much over exposed plates was allowed to act till details in the lights were fairly visible and then its action interrupted by flooding the plate with water. It is, however, a well known fact that chemical action upon a gelatine plate can not be so suddenly arrested as with a Collodion plate, and that developer, reducer or intensifier will continue to act till the chemicals having permeated the film have been thoroughly washed out. For this reason the first development should not be quite carried to the desired point. The image obtained, presents now details in the light portions hardly perceptible on the original negative, with the shadows much over exposed and consequently feeble and monotonous. We proceed now to strengthen up the image and give it tone with old developer, used repeatedly but of the composition above described. The image will build up gradually and with an increase of density of the over exposed parts, details in lights will continue to be developed till a harmonious positive is obtained. The noticeable feature in the method described, is the departure from the course usually adopted, to commence developing with old solution and finish with freshly prepared. My renouncing the orthodox doctrine here has been caused by the desire to reproduce details unapproachable by ordinary means and through which the end has been successfully attained.

No other developer permits of such an enormous working latitude as eikonogen; with neither ferrous oxalate, pyrogallol or hydroquinone, results similar to those described are possible, and it is easily understood why the great majority of operators give preference to eikonogen over all others, but mainly so in the production of diapositives.

SOME THINGS THAT PUZZLE BEGINNERS.

By P. Ersly, Hillsboro, Texas.

Some of us remember well the time when but little knowledge of photography could be gained from books. To-day only a few dollars expended for photographic literature places the whole theory within one's reach. But, while many seem to comprehend it all and are skipping along nicely, the masses are by no means masters of the work in which they are engaged, and are very often much puzzled by the instructions given. For instance, one says, for an under timed plate, soak it in No. 1 of the developer awhile, then add No. 2 Another reverses it, and says, soak first in No. 2, then add No. 1. Now, while the skillful operator studies and experiments, and learns for himself which way is best, there are many who want to be told just how and what to do, with no effort to study on their part. To such let me say, the masters did not buy their most valued knowledge. They gained it by hard study, practice and experience. If we would be masters we must do the same. For my part, I never lose my interest in developing the image. I start the development with weak developer; as soon as the image appears, I determine whether it is coming out all right. lacks density, change the developer to produce it. A little less of No. 1 brings up the shadows, while less of No. 2 strengthens the high lights. This watching and changing to meet the requirements, to me is fascinating. Just think what the possibilities are. Why, it seems to me possible to produce almost any effect one desires with either of the standard developers. Yet those of limited experience need not expect to produce those fine effects while working at a disadvantage, such as developing over or under timed plates, that experts do. It requires good judgment, close study, and a vast amount of experience. This to me is pleasure indeed.

My advice is to aim at correct timing, develop as near right as possible without redeveloping; then, if any change is necessary it is so slight it is easily accomplished. Right here let me again urge the operator to give up working by ruby light; to me it is terrible.

Just place a sheet of green tissue paper over the ruby light and see how nicely you can work by it.

Now let us notice some of the instructions that puzzle the

printer. One says, keep paper in a damp place. Another says, keep it in a dry place. Another says, keep it in a damp place over night before sensitizing it. Now, here in this climate, paper often gets so damp that it is unfit to use until it is dried, while in long dry spells it gets extremely dry. My advice is, keep paper dry. If too dry, it may work the better for exposing it to a damp atmosphere a few moments before silvering, but if it is already damp, never dampen it more before using it. An intelligent printer can tell very easily whether it is too dry or too damp. Learn to keep it in the right condition and save the curses on those who prepare or furnish it. Again, the silver bath: one says, keep it sixty grains strong; another says forty. Now, who is there that cannot tell which works the best? Try it both ways and learn for yourself. It is easy to tell by the action of paper by close watching what is right or wrong. And then the fuming. Some say fume ten minutes, and some say an hour. If paper is too damp when silvered, long furning is injurious, while if extremely dry when silvered, and dry when put in the fuming box, long fuming does no harm. Again one says, make your fixing bath four ounces hypo to twenty water. Another says, two ounces to twenty. Right here is where some of our masters have made a great mistake. Let us forgive them for they have given us so much good advice. But I can put a print made on the paper I am using now (N. P. A.) in a bath two ounces to twenty and it blisters, while a bath, two ounces to thirty, works all right. In practice I find pictures will fix in ten minutes, in a bath two ounces to thirty. Left in five minutes longer insures thorough fixing. Try it. Yes, be not satisfied with what they say, try for yourself. Prove or disprove all your instructions. Study all the changes, conditions and causes, and make yourself master of the work you are engaged in.

THE OUTCOME OF PHOTOGRAPHIC PROGRESS FOR 1889. By J. A. Forrest, England.

May be said to be the following:

First.—Celluloid as a support of the sensitive film, instead of glass, as perfected by Messrs. Eastman and other makers.

Second.—The Alpha plates for lantern slides, as issued by the Ilford Co., giving variety of colors in the printed slides.

Third.—The survey, as proposed to the Birmingham Photographic Society, of the County of Warwick.

Fourth.—This year has been marked by a growing extension of lantern exhibitions with slide illustrations.

Celluloid so far has not been utilized for lantern slide purposes, from a feverish feeling that because it is made from gun cotton it must explode when exposed to the heat of the lantern. I have tried it by throwing it into the fire. It burns like a piece of nitre paper and would not startle a child.

If precaution is required, place the celluloid between two glasses in one of Messrs. Mawson & Swan's "Silverine" frames. I firmly believe it would hold its own against glass.

Eastman's 3½ in. (circle) Kodak roller slide, for sixty views in each spool, extends its usefulness immensely, bringing it within the compass of lantern slide size and also suitable for enlarging to framed sizes. To the world wide wanderer it is invaluable. I see no reason why paper of the Alpha kind should not be printed upon from celluloid negatives. The Alpha lantern plates are a "Red letter" discovery and open up the field of color to luxuriate upon, being truer to nature in many cases. I have seen some slides by G. E. Thompson, of Liverpool, producing two colors on the same plate which is a great improvement. The slides of rising and setting suns, by Paul Lange, of Liverpool, are simply charming pictures, which once seen can never be forgotten, because the sublime scenery of Norway is fully realized. No man has given a greater impulse to hand cameras than Mr. Lange. The word "detective" should be obliterated.

The Americans ignore technical instruction, and make short cuts to gain results. As proof of this, an American placed in my hands a dozen pictures $2\frac{1}{2}$ inches in diameter developed and printed in America by the Eastman Co. This is photography made easy and reduces it to a pure pastime, leaving the dollar to do nearly all the work.

NOTES ON ENGLISH ARCHITECTURE.

By J. A. Forrest, England.

Every Spring or Summer I meet with Americans visiting the last resting places of our poets, and viewing the ruins of ecclesiastical buildings made memorable by historic associations. It

occurs to me it will serve the interests of our transatlantic cousins if I give an epitome of English architecture, in as much as it is complete as a system, by giving them a table of dates and places where they will find the system actually displayed and thereby give a new interest to those who love antiquarian research. The only building that I know of that does not conform to this system is Roslin, near Edinburgh, and that is explained by the fact that it was designed by a French architect.

TABLE OF EXAMPLES OF ENGLISH ARCHITECTURE.

Norman—Prevailed 124 Years.

West and South doors, Iffley, Oxfordshire, 1160 A. D. Circular window, St. James', Bristol.

West window, Castle Rising, Norfolk, 1160. Durham Cathedral and Kirkstall Abbey.

Early English-100 Years.

Great Milton, Oxfordshire, 1240. Polebrook, Northamptonshire, 1220.

North Transept, Westminster Abbey. West Transept, Romsey Abbey, 1250.

Transition—25 Years.

Beverley Minster.
Salisbury Cathedral.
South porch and door, Woodford, Notts.
Circular window, Lincoln Cathedral.

Decorated—70 Years.

The West window of York Cathedral. The West window of Exeter Cathedral. The East window of Carlisle Cathedral.

The West front of Lichfield Cathedral.

Perpendicular—169 Years. Beauchamp Chapel, Warwick, 1439. The windows of Abbey Church, Bath.

Canterbury Cathedral.

Winchester Cathedral.

I have found it a very pleasant exercise to copy masons' marks on each stone and thereby to discover the same mark on other buildings. For instance, I copied seven at York Minster and found four repeated at "Fountains Abbey." Wells Cathedral is the only one I know whose central tower is supported by an inverted arch.

NOTES ON THE MAGIC LANTERN.

By Dr. H. D. Garrison, Chicago.

The bright disc thrown upon the wall or screen, is simply the image of the incandescent part of the lime. The lantern slide acts as a partial screen, shutting off the light more or less completely from corresponding parts of the disc. If the lime is heated over too great an area, or particularly if a lamp giving a long flame is employed, a considerable part of the whole light produced is not utilized. It would seem that an area of incandescence, about as large as a nickel, is all that is of real service; but, in order to get that of the right quality, the lamp flame must be made much larger, particularly in the vertical direction. A reflector causes but a slight increase in the brightness of the disc, because the flame, consisting of dense fog of incandescent molecules of carbon, is opaque to light attempting to traverse it. If a slide is colored, the light which succeeds in passing through, will produce the same color on the disc; but, if the paint employed is not transparent, no matter what may be its color by reflected light, only a dark spot or cloud will result.

The light emanating from the foremost condenser and going to the camera tube is in the form of a cone, with its base at the condenser, and its apex, if regularly produced within the camera tube. The diameter of this cone, at the point of entrance into the rear lens of the camera tube, does not exceed one inch, when 4½ inch condensers are employed; therefore, a small lens, say 1½ inches in diameter, will work as well as a much larger lens, provided only, that the curvatures are the same. There are those who think they believe, that a disc of a given diameter is brighter when produced with a short focus camera tube, than a similar disc produced at a greater distance by a camera tube of longer focus. That this is a delusion, is evident when we reflect that exactly the same amount of light is spread over the same area in both cases, the loss by passing through the atmosphere a little further being infinitesimal in quantity.

A CHEAP PRIVATE STUDIO.

By J. T. Harris, Indianapolis, Ind.

Amateurs desirous of doing portrait work, and having sufficient space about their premises, can easily and cheaply construct a studio that will answer their purpose admirably.

I make this statement from my own knowledge, and will now give my experience, hoping thereby to give a few hints that may be of interest to some of my fellow amateurs.

Having tried portraiture in a private room with but little success, I cast around to see it 1 could get something better, and the result has given me entire satisfaction.

In my backyard stood an old wood and coal shed, which, since the advent of natural gas as a fuel, had fallen into disuse; this I pulled down, and with the old lumber and some new that I purchased, I built a room 21x12 feet, made the sides six feet high and about eleven feet to peak of roof, using common boards for sides and ends, and covered it with shingles.

I put in a skylight, facing north, using old 10x8 negatives, which I had cleaned off for the purpose, and a couple of old window sashes for a side light, put down a rough board floor, and in one corner, easily made a comfortable dark room.

I find that I have a pretty fair studio, with plenty of light, and easy to manage and at an outlay (not counting my work) of only eighteen dollars.

For backgrounds, I stretch unbleached muslin on a frame, and give it a coat or two of whitewash, composed of lime, a little glue and lampblack. The lampblack should be cut with vinegar before mixing with the lime.

NEW FORMULAS FOR EIKONOGEN DEVELOPERS.

By Captain Eugene Himly, Berlin.

Over a year's time having elapsed since the introduction of the new developer, eikonogen, invented by Dr. Andresen, and manufactured by the Gesellschaft für Anilin Fabrikation, of Berlin, it can be conceded that its action is favorable. At first, a number of different preparations were in the market, some being even quite dark brown in color and solution; at present the factory manufactures crystals, which keep decidedly better. There being still complaints about the keeping qualities of stock solutions, I decided to experiment with it, and after many trials I found that the addition of glycerine is very advantageous. I can recommend the following recipes:

Water, 1000 parts. Glycerine, 100 parts. Potassium metabisulphite, 2 parts. Sodium bisulphite, 75 parts. Eikonogen, 12 parts. Carbonate of potassium, 60 parts.

In consequence of my last year's experiments with ferrocyanide of potassium as a favorable addition to hydroquinone developer, I concluded to try this salt also, with the eikonogen developer, and found it acted so well, indeed, that I do not hesitate to recommend the same to all amateur and professional photographers for trial. The addition of ferrocyanide of potassium is of good influence to the keeping of stock solutions even mixed. Furthermore, the pictures get more contrast in the high lights, they are clearer in the shades, and it prevents also fogging during development. The formula, which I can well recommend, is the following:

Water, 1000 parts.
Glycerine, 100 parts.
Potassium metabisulphite, 2 parts.
Sodium bisulphite, 75 parts.
Eikonogen, 12 parts.
Carbonate of potassium, 60 parts.
Yellow prussiate of potassium, 40 parts.

This solution keeps also for months, but after some weeks it requires to be filtered again, when ordinary water is used.

Both formulas which are here given can be used without diluting or diluting with one to two parts of water. For traveling purposes the bulk of the stock solution can be diminished by using the same amount of water in the recipes, but doubling all the weights of the other ingredients. For accelerating development, add a few drops of a solution of caustic soda or caustic potassium, 1 to 10 of water.

In case it is desired to use carbonate of soda instead, the quantity for both recipes would be eighty parts of carbonate of soda in each prescription.

GLUE RELIEFS FOR THE PRODUCTION OF WATER-MARKS, STAMPING OF PAPER IN VARIEGATED COLORS, AND THE PRODUCTION OF INSTRUCTION BOOKS FOR THE BLIND.

By J. Husnik, Prague.

The watermarks which still appear at the present time on almost all kinds of letter paper, bank checks, stocks and other financial papers, are produced by two different processes. One of these is with the aid of the "Egoutteur," that is, with a mark placed into the sieve, and thus modeling the watermark during the formation of the paper. In the other process, glued thread is pasted on a piece of heavy cardboard, across the letters or design previously drawn on the board, which, when dry, is pressed into the paper with a burnisher wherever a watermark is wanted.

Both methods give only extremely coarse lines and contours of designs, so that, for instance, a hand of the size of 1½ cm. will appear without fingers, like a pair of mittens, and the face reminds one of the primitive drawings and caprices of little children.

Besides these two kinds of cartoons for water printing (generally designated with the name of "cover"), better work is produced by cutting very fine letters and designs out of strong parchment paper and pasting them on cardboard. But such covers are very dear and leave a good deal to be desired.

I have succeeded in putting any agreeable lettering or design on a thick gelatine film flowed on a piece of heavy cardboard, by simply photographing the design, copying the same on the Leim sheet and developing until all gelatine has been removed and the design or drawing remains in relief.

If a photographic copy of the drawing is to be produced as a watermark, it is taken with a net, and is therefore autotypic and must be treated accordingly.

As such gelatine relief covers, will endure 100,000 impressions for watermarks, it is now easy for everybody to have his own portrait, picture of his factory, name of the firm, or any label, handsomely decorated and clear, as a watermark, put on his letter paper; and a large field is opened in the same way for watermarks on stocks, bank papers, passports and all kinds of official documents.

The firm, Leykam Josephsthal, in Vienna, has acquired the patent for the production of watermarks by gelatine reliefs, in Austria, and is receiving already large orders from all countries.

By a small modulation, Leim reliefs can also be applied. They are stamped in paper of variegated colors, and such stamped papers are then used in the manufacture of book covers, paper boxes, etc.

In such a manner, the most complicated drawings can be stamped into the paper, and as the production of these reliefs is attended with almost no expense, it can easily be judged what immense advantages the covers offer for this branch of industry, engraved steel or brass plates being at present used for this purpose at considerable expense.

Instruction books, maps, etc., for the blind can also be produced to great advantage with my gelatine reliefs. The books heretofore made for the blind and produced by stamping the letter or type with pointed moulds on heavy cardboard, are very defective; the pointed reliefs lose their sharpness so quickly after having been touched several times by the blind when reading, and the contours disappear so much, that the signs can only be deciphered with difficulty.

This is not the case with my reliefs, which are so hard that they will never wear out, and by their easy and cheap manner of production, the possibility is offered to furnish books, maps, etc., for the instruction and entertainment of the blind in a way not before attained.

THE HUMAN FACE FROM THE REALISTIC POINT OF VIEW.

By W. Hanson, Leeds, England.

Observation, afforded by long practise of photographic portraiture, has almost convinced me that a perfectly symmetrical human face is rarely, if ever, met with after the age of childhood is passed. Perhaps this statement may be regarded by many, particularly of the fair sex, as being much too sweeping in its scope. However, it is not recklessly made, being founded, as I have said, upon long personal observation of many faces varying in type and beauty.

The habit, if not art, of accurate observation is acquired by all in

some degree, but inasmuch all have not equal opportunities for observing the same kinds of phenomena, one person may perceive at a glance minute differences between things with which he is familiar, which another, equally intelligent, would quite overlook from want of experience in the same field of observation; so a photographer, not because he has more intelligence than other people, but by reason of being continually exercised in the work of observing faces, acquires a power to discern even slight departures from absolute symmetry which an unpracticed eye would probably not perceive.

The ideal notion that the two sides of the human face are exactly alike dwells in most minds, though it be perhaps vague and indefinite, and is not easy to remove. The more flagrant departures from symmetrical order are readily ascribed to accidental violence or malformation, and are dismissed as mere exceptions to a general rule; but continued and closer observation, in time, works a conviction that very few human faces are perfectly symmetrical after all, excepting perhaps in childhood; for they are found to have two sides that express different phases of character, one conveying the idea of more strength, intelligence, benignity or humor than the other, but the distinguishing characteristics of an individual face are only fully expressed by both. One eyebrow raised above the other; a nose bent more or less on one side, or a mouth not horizontal, are accidental dislocations of features which may be due either to physical causes that are plainly obvious or to others inherent in the moral nature of the individual; therefore it becomes a question for the photographer to determine how far it is judicious to attempt by means of posing and lighting to restore disordered features to apparent symmetry; in as much as truth of likeness, which of course includes all that is characteristic of the original without exaggeration on the one hand or too much extenuation on the other, is the first and most precious quality of a good portrait, and nothing short of this great quality can permanently satisfy the eye, which thirsts as much for truthful realistic representation in portraiture as it does for light itself.

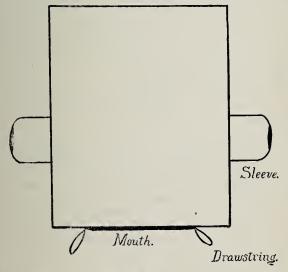
These general suggestions are not intended to apply to retouching so much as to the far greater art of posing, for it is very easy, as we all know, by a slight change of the point of sight, or by causing a face to be raised or lowered, less or more, or to be turned in some measure one way or another, either to exagger-

ate its peculiarities or to diminish them. One extreme produces caricature, the other insipidity; but between these there is always to be found a truthful characteristic likeness, and they (of either sex) who, in general practice, discover this happy medium, possess the true artistic faculty for photographic portraiture; at least that is my humble opinion.

A PLEA FOR THE CHANGING BAG.

By Chas. Harris, M. A., Oxon.

In these days of changing boxes, multiplying backs, roller slides, ct hoc genus omne, I sometimes wonder that the simpler and less cumbrous changing bag does not find more favor. I fancy the reason must be that changing bags are so little advertised by photographic dealers; and, therefore, their very existence is, to the majority of beginners, almost unknown: at all



events I have looked through several of the catalogues of welknown houses without finding any mention of such an article. Now I think that the following considerations form a very eloquent plea for the use of our apparently much despised friend.

- (1.) Plates can be changed, in broad daylight, from the dark slides to storage boxes, and the dark slides refilled at once for use again; the exposed plates being placed at the bottom of the box from which the new plates are taken, for example; and this can be repeated as often as may be desired; whereas, with the changing box only a limited number can be placed in it for consecutive exposure. With a changing bay, on the contrary, the sole limit to the number of plates exposed in a day's work is expressed by the number of boxes of unexposed plates which the photographer is able to take out with him. It practically means that he can go on exposing plates all day long, merely refilling the slides as soon as the plates in them are all exposed.
- (2.) It does away with the use of the non-actinic or ruby lamp, when one is away from home. The tourist need no longer encumber himself with this: the changing bag does all that is needful (except for developing purposes), and there need be no waiting till the evening for darkness. I find it quite easy to change the plates in the bag by feel; a very little practice gives one complete confidence in working in the dark; but if desirable the head can be inserted, without admitting any white light from outside, and the red light which penetrates the fabric of the bag will be found quite sufficient to see by, while it is perfectly safe, even in bright sunshine.
- (3.) It is portable and easily packed; it may be strapped up with the legs, or folded and packed in the camera case.
- (4.) It can be used as a focusing cloth, for which it may be substituted in the outfit.
- (5.) It is useful also at all times for the reception of any plates which require to be temporarily secured from actinic light.
- (6.) And lastly it is *cheap* as well as serviceable; mine cost me only five shillings and sixpence, the value of the material—the process of making being performed at home,—a plan which I recommend, for I am told that a similar bag purchased at a photographic dealer's would cost at least four times that amount.

I proceed now to give directions for making one of these useful articles.

The bag is threefold throughout; two thicknesses of red Turkey twill are employed, between which is inserted one thickness of yellow sateen.

Quantity required, of Turkey twill (if thirty inches in width), four yards; of yellow sateen (same width), two yards.

Dimensions of bag when finished are as follows: length, 2 ft. 10 in.; width, 2 ft. 2 in.; width of mouth, 1 ft. 4 in.; width of sleeve, 8 in.; length of sleeve, 8½ in.

The mouth of the bag is at one of the narrow ends, and is secured by a double drawstring; the other end has no seam, the stuff being merely folded. The sleeves are inserted at a distance of nine inches from the mouth end, and are provided with strong elastic cuffs to grip the coat sleeves. When the arms are introduced, the sleeves of the bag turn outside in, and thus plenty of play is secured for reaching any part of the interior.

THE PHOTOGRAPHER'S APPRENTICE.

By I. H. E. I. Harris, England.

This is such an age for doing everything in a hurry. There is no time for plodding, no time for quiet mastery of detail, before launching into our various vocations. Just a superficial acquaintance, plenty of assurance, and the neophyte bursts into notoriety, a "regular practitioner." And when we turn out our cart wheels and our coffins, our suites of furniture and our farm yard chickens, more or less by the agency of steam, the modern trader is apt to feel somewhat insulted if asked whether he has served his time to an especial line of business. Buy in the cheapest market, regardless of sweating or something worse; sell at a profit, what matters where or how the goods are produced so they are sold. This is the spirit of modern commerce. And the photographer has caught on, has imbibed and drunk deeply from this spirit of the age. What young man is there who would be content to serve seven years of his life to learn the business or profession of the photographer? If, in the guileless state of his heart, this young man can be found, where are the parents and guardians who would suffer him so to waste his time, when the whole bag of tricks is to be learned for nothing by purchasers of the turn-the-handle outfit. And when the needy ones of the earth publicly announce all branches of the profession mastered in three months in return for a miserable premium, of course returnable in salary, there is small chance for the outside world believing other than that the photographer's art is a mere bagatelle, acquired after the fashion of the fried-fish or oyster-stew occupations. How many photographers commenced practice by engagement as printer's devil, and when competent to change frames, passing upwards to the dignity of printer, in which capacity they remain till familiarity with the photographic pose enables them to start forward as operators and retouchers!

Apprentices indeed! where is the room for apprentices in an order of things such as this? The apprentice for seven years, and no less time will fit a youth for a vocation in life, this apprentice will expect to learn something more than stuffing his head under the photographer's "rag." And if he be initiated in the mysteries of balance and contrast, he will of a surety want to know, in addition to theoretical dogmata, the reason why. He may study this theory, he may read his treatise, find why are such and such lines in the picture to take a certain prescribed form. He reads that he is to balance the head on the shoulders. and he surveys his screen in an intensity of mental agitation, anxious whether he has carried out the instruction. But instead of beginning at the wrong end, why not train the novice to draw a head and shoulders on paper from his own inception. He will understand in a month of this practice more about balance than if he had learned by heart all the books which have been written on the subject. Unfortunately for the apprentices, how many master photographers are there capable of imparting this very necessary information to their subordinates? No wonder people run away with the idea that a photographer's business is to be learned in three months, ample time in which to master some of the intricacies of dry plate development; and then, the camera does the rest. Let the camera be subordinated to its proper level, that of delineating a conception set before it, and which conception shall be in accord with artistic canon. accord can never be attained except by that freedom and mastership of composition which the art of drawing gives to its votaries.

There is nothing easier than to find fault. And perhaps there is nothing much easier than to tender advice, to show by dissertation or by treatise how the stiffness and awkwardness in photographic poses may be avoided. Give us apprentices who in time will be able to draw the human figure, and there will be neither photographic pose nor stiff and awkward figures. The lines of the human form will fall into place because the artist knows how to compose them, and familiarity with these lines

will lead to more importance being attached to them than to the size of the diaphragm used in the lens.

Judging by articles which from time to time appear in the various organs of professional opinion, some of our brethren are slowly arriving at the conclusion that the public understands a little about art, and that the novelty of the first photograph having worn off, something more is required than another photographic pose. Speaking approximately, one photographic pose resembles nothing in this world so much as another photographic pose. Cast in the same mould, taken from the same model, turned out by the same machine, as if steam were the motive power and originality of conception an unknown quantity. Very true to nature in delineation of feature and exquisite symmetry of the new dress made or worn expressly for the occasion, but tame and uninteresting by reason of that wealth of monotony which is so characteristic of the family album. Paucity of invention, absence of individuality, lack of sympathy, these are defects natural in one attempting to create before mastering the art of construction. Surely it is not too much to expect that prior to delineating the human anatomy by agency of the camera, that the delineator should possess some idea of the proportions of that anatomy in a state of nature. And the apprentice trained in this school will not require to see how it looks in the camera, before feeling certain in his mind that he has produced a composition. He will know that the camera performs its mechanical draughtsmanship in drawing or out of drawing, according to the skill or clumsiness of the mechanician who sets the machinery in motion. And being a draughtsman he will be competent to know when and where the subject varies from his ideal of perfection of form. The photographer, by the nature of his calling, has to compose that which should be a work of art at a moment's notice. The painter has opportunities of leisure and reflection in working out his ideas which are denied to the photographer. All the more reason why the artistic culture of the latter should not be one jot behind that of the former.

But what are the facts? Under present arrangements what chance, what opportunity is there for the would-be learner to do other than forge ahead as quickly as possible, with two guineas a week as the summit of his ambition, and hurry up from devil to printer, from printer to operator, without any art instruction other than mental retention of somebody's photographic poses.

Seven years for this, why, a quick, sharp-witted youth would rival his mentor in a month. And of such is the rising branch of photographers being generated. If the camera execute the drawing, the poor scapegoat can only reproduce those wondrous conceptions of the human brain, those stupendous compositions they call them, which have been set before it by one whose anatomical knowledge is generally circumscribed, and who therefore depends for his ideas by borrowing more or less from the inceptions of those whose power of delineation of the human figure is fully equal to the fertility of their imagination. The philosopher teaches us that in this world it is in the nature of things for "life to be constantly passing onward and upward through a series of constantly improving forms towards the better and the best." Let each one of us remember this doctrine in connection with the photographer's apprentice, and let us give him a chance. by a course of sound art culture, to make the photograph of the future a long step in advance towards bettering the present.

COLORED SCREENS AND COLOR SENSITIVE PLATES.

By Romyn Hitchcock, U. S. National Museum, Washington, D. C.

The colored screen is a very important adjunct in the photography of colored objects. Its value is not so generally recognized among operators as it should be, perhaps because the principle of its application is not always understood. The full benefit of the yellow color screen, such as is now in common use for landscape work, for example, is only to be obtained with color sensitive plates. Frequently in copying paintings, even when using ordinary plates, a yellow screen can be advantageously employed to reduce the photographic effect of the blue and violet colors. But in this case there is a restricted action in the yellow and orange, unless the exposure is very greatly prolonged.

An ordinary gelatino-bromide plate is sensitive to a sunlight spectrum from a point between the Frauenhofer lines E and F to about K, which is about the limit of the visible spectrum at the violet end. The range from F to K may be regarded as the extent of photographic action on a plate rightly exposed for a landscape picture. It is not quite true, because sunlight and

diffused daylight do not manifest exactly the same photographic action, but we need not now consider such nice distinctions. The maximum of photographic action is about line G.

The ordinary gelatine plate, however, is sensitive through a much greater range of the spectrum, but far less so than to the region thus marked out. By prolonging the exposure we can extend the action to R, or, if we use quartz lenses and prisms, to a point much beyond that where the wave length of the light is only 1852 ten millionths of a millimeter. In the other direction the spectrum may be photographed as far as the orange and the beginning of the red, but not without excessively long exposures, and never so as to show the lines distinctly. The result of such long exposures is to woefully over expose the more active parts of the spectrum. Therefore we may regard all that portion of the spectrum from the green to the red, as practically inoperative, when we take a picture on an ordinary plate.

But suppose we introduce a screen which will partly absorb the more active rays and allow the others to pass. We may then prolong the exposure until the latter rays have impressed the plate, while the more active rays, being reduced in quantity, act with about the same vigor as the green and yellow. In this manner the different colors would be correctly rendered in photographic tones. In practice the result is not perfect, partly because such a nice adjustment of the color and thickness of the light filter is not possible, and partly because the plate is not sufficiently sensitive to the longer wave lengths to give a satisfactory picture with a reasonable exposure, even if the screen were perfect.

With color sensitive plates the range of photographic action extends far into the invisible region beyond the red of the spectrum. Considering, then, the general sensitiveness of these plates, they are often said to be more sensitive than ordinary plates, because they are sensitive to a greater number of rays. This is true enough, provided the sensitiveness to blue is not reduced by the method of preparation, for thus we add red sensitiveness to the blue. The practical question is, can a picture be taken in less time with such plates? Undoubtedly it can be. But this is not true of all color sensitive plates, for some of them have red and yellow sensitiveness at the expense of the blue.

If our optical apparatus, such as telescopes and microscopes

were perfect, there would be no advantage in the use of screens with plates sensitive to all spectrum colors. But with ordinary telescopes and microscopes there is a visual focus and a photographic focus, and whenever these two do not coincide we may immediately conclude that, without color screens, the ordinary plate is really better than a color sensitive plate. With such instruments, the more restricted the range of sensitiveness, the sharper will be the definition. Sharp definition may be obtained with imperfectly corrected instruments, either by restricting the sensitiveness of plates, or by using monochromatic light. This fact was recognized many years since, when the ammonio sulphate of copper cell was introduced to give blue light for photomicography. But there are serious objections to the use of monochromatic light in microscopical photography. When color sensitive plates were introduced, yellow screens took the place of blue, for it was immediately recognized that many specimens had vellow and red and brown parts which did not show any details in blue light. The sensitiveness of the new plates make it practicable to work with yellow screens without greatly prolonging the exposure.

With the objectives and compensating oculars now available for microscopical research, and with color sensitive plates of approximately equal sensitiveness through the greater part of the visible spectrum, the color screen is no longer required to secure sharp definition, but it is very useful in photographing deeply stained or colored objects.

When microscopical preparations are stained violet, the yellow screen should not be used, for, since no violet light can pass the screen and the object is opaque to the yellow light, we can thus only have photographic action over the field outside the limits of the objects delineated. The violet objects are, therefore, not photographed at all, but they are shown as mere shadows of opaque objects on a screen. This may do for apparently structureless rods of bacteria, perhaps; but even with such preparations I should think more satisfactory pictures would be obtained with light which would contain a fair complement of violet rays. As yellow preparations cannot be photographed without plates sensitive to yellow light, so violet objects must have violet light. Unless we want mere blank silhouettes we must use light which our specimens can transmit. The light should correspond to the different colors or shades of color of

the object. It is owing to neglect of this consideration that we often see photomicrographs which are mere silhouettes, while the objects show much more structure. This is frequently observed in photographs of such structures as the tongue of a bee, sting of a bee, legs of insects, etc. In other preparations in which the color is a stain—brown or red, for example—the fault lies partly in the exposure, which, in many cases, is insufficient to give more than outlines and blank interiors. This is noticeable in many photographs of bacteria which I have seen.

As a matter of fact, by a proper choice of a screen, if a screen is required, and proper exposure, a photomicrograph will show any object as clearly as we can see it in the microscope.

The color and thickness of the screen, both require attention. If it be too thin, the blue light is not sufficiently cut off. In particular cases an almost monochromatic yellow light is desirable, as when, in microscopy, it is desired to obtain sharp outlines of deeply stained objects, regardless of structural details.

The screen for landscape work must be very carefully chosen with reference to the plates used. Here we do not want monochromatic light, but light of all colors, only with the colors properly proportioned. Dr. Vogel maintains that his plates do not require a screen for landscapes, and he shows good evidence in support of this conclusion. But generally a screen is desirable for the color sensitive plates in the market. It must not be strong in color. The purpose of the color screen should be to give definition, not to increase contrast.

One of the favorite yellow screens now in use for photomicrography is that of Dr. Zettnow, of Berlin. It is composed of:

Copper nitrate, 160 grammes. Chromic acid, 14 " Water, 250 c. c.

or it may be made thus:

Copper sulphate, 175 grammes.
Potassic dichromate, 17 "
Water. 1000 c. c.

These solutions must be diluted according to the depth of color desired. The first one is much too strong for use. There is no reason for using a screen so deeply colored as to greatly lengthen the time of exposure, as I have known experimenters to do. If the worker will only consider the proper function of a

color screen and use it intelligently, the results will be well worth the trouble.

There is one field of work in which, so far as I am aware, color sensitive plates have not yet been used, but in which they are absolutely required. This is the photography of microscopical rock sections with polarized light. This is a subject in which I doubt not lithologists are interested, and those who have tried to make such photographs will know very well how difficult it has been to get satisfactory results. The special plates afford a means of representing the true appearance of a section of rock most perfectly. Colored transparencies for the lantern can be made from negatives on such plates with entire satisfaction.

A REMEDY FOR MEALY PRINTS.

By J. B. Heyl, Hamilton, Bermuda.

A great deal has been written about the fading of silver prints, but I have not been troubled in that way. I have prints over twenty-five years that are as good as ever. My greatest trouble has been mealy prints—and for years they have troubled me—I sent prints to London and the United States-my answers were as follows: Printing in hot sun light, Mr. Anthony, (and I think he was nearer than anyone as you will see); Hypo not washed out, when the prints were washed to death—use of old paper, when I knew the paper was fresh and good, leaving ammonia in the cup after fuming without throwing away the old, before putting in fresh, and lots of others which I have forgotten. Sometimes it would make its appearance in two or three weeks and at others never. It has only been within the last twelve months that I found out the trouble, after throwing down baths, washing out rooms, getting new dishes, bottles, etc. And the simple trouble was, that I did not put the paper after floating it, in a box with a small lamp or stove, making the paper bone dry; since learning this, I have had no mealy prints; our climate is at times very damp and the paper holds the moisture, to which, I think, the ammonia adds, and not being dry enough when put in the fuming box, the result, on exposure to the hot sun is a decomposition. I think Mr. Anthony was nearer the mark than any one. I always use a white tissue paper screen over my printing frames,

The box I use is nothing but a common packing case, standing five feet high and with hinged front, with lines across and clips to hold the paper. A space at the bottom contains the stove.

FROST STUDIES.

By Frank Hopps, England.

In all the seasons of the year there is no more beautiful time to the eye than when the trees, and all outdoor objects, are clothed in white hoar-frost. It is at this time that the artist and lover of nature should not be idle, but should be ready to take every advantage of the somewhat rare opportunities when they occur. To the artist in photography frost studies are specially interesting, as, by means of their art, some of the most beautiful of nature's effects can be rendered into true pictures.

There are always some little difficulties experienced by those who wish successfully to photograph frost views, and I have here endeavored to show how these may be overcome. In the first place it should be the wish of everyone to obtain a *real picture*, and not merely a representation or copy of a bit of hoar frost.

It will be readily observed how great is the contrast between the intensely white frost and any naturally dark objects; and here lies the secret of making a picture. It is to represent the frost and the dark objects together, in their proper scale of light and shade.

One would naturally suppose that this would be somewhat difficult to render by means of photography, and so it is. But by selecting a view which contains shadows not too deep, and by careful manipulation in the development of the negative a satisfactory picture should be the result. By the intelligent observer it will be noticed that frequently in looking up and then down a lane, when the trees are covered with the white rime, a great difference will be noticed in their whiteness. This is due to the wind having blown some of the frost off the trees in the direction in which it was blowing, therefore leaving the branches and twigs partially bare. The trees viewed in this way appear dull, but if we turn round and face the wind, they will appear quite white. This should always be looked for. Almost anything serves as the dark object to be introduced into a frost

study; the road, some cattle, a shed or a cottage. We should then expose our plate for the dark object, and, if developed properly the frost will also appear in its proper scale—that is, not too white. It is advisable to use a plate which is not too rapid, and to develop with a solution warmed to a temperature somewhat above that of the atmosphere when the view was taken. The size of the picture is quite a matter of taste. Charming little studies can be made on plates 10x8, $8\frac{1}{2}$ x6½, or smaller.

In conclusion, it is to be hoped that next winter we may have some good frosty days to enable us to study nature in one of her most beautiful forms.

IF NOT, WHY NOT? OR PROFESSIONALS vs. AMATEURS.

By E. K. Hough, Fredonia, N. Y.

Professional photography is threefold, an art, a science and a business. To succeed well it must be strong in all three. But it is a mockery of success to succeed in the two first and fail in the last. Amateurs may work for honor without profit, for as a rule they have other means of support, but the professional usually gives his all to his business and must live by it.

It is understood, strictly speaking, that amateur photographers are those who practice it for recreation and the love of art, and not for profit by the sale of their productions.

But the desire of gain is so strong in all Americans that few can resist, if the opportunity to make money appears, and I suppose there is a certain pleasure in turning their amusements to profit, akin to winning money on a bet or at a raffle.

This feeling is so well understood that dealers in photo supplies openly ignore the distinction between amateur and professional, and appeal directly to this love of gain, by giving them assurance of easy success and speedy profit, thus urging them into direct competition with professionals.

I ask space here for exact copies of two regular advertisements which I have just cut from late papers.

The first is from an unknown and perhaps irresponsible firm in Maine, who offer much and promise more. A possible fifty dollars a week with no care and little labor, is certainly alluring. But read for yourself.

Save you \$10.00 to read this.

COMPLETE PHOTO OUTFIT FREE.

To introduce our new style instantaneous process, whereby you can take 50 of your own or friends' pictures—can copy and take hundreds from old Photos, or your own or friends' pictures—can copy and take hundreds from old Photos, or new pictures found in books, &c., from Photo size to 6x8 in. You do away with paying \$3.00 or \$5.00 per dozen for Photos, and can establish a profitable paying business right at home—some clear \$50.00 in one week making pictures. Any one can become an expert. It is delightful, easy work, for lady or gent. No chemicals or costly articles needed. Outfit also includes half dozen negatives so you can print Hundreds of Fancy Pictures, to sell, from them. As we want to establish an agency in every town, we will send one sample outfit to introduce the business at once. Inclose 25c. for packing, &c., and we send it securely boxed.

You will exclaim that must be a sell—they can't do any such thing—such promises are worthless—it is only a bait to catch the unwary and fleece them.

Well, it may be so; but it appeared in a respectable journal, Butterick's Fashion Monthly, and when you read the following advertisement from one of the oldest and most honorable houses in the trade, which I cut from The Youth's Companion, where it has appeared for many months, you will be surprised to see how many points of similarity there are in the inducements presented and promises made.

Read it and compare.

AMATEUR PHOTOGRAPHY.

Do you realize what possibilities of amusement, interest and profit these two words suggest?

Any one can "take pictures" now, and many enterprising boys and young men are taking MONEY right and left where there is no local photographer. It is no longer an experiment, for with ordinary care a good photograph can be made by any intelligent person. Everything plain. Printed instructions. A book, "How to make Photographs," and illustrated catalogue of "Amateur Photography" Outfits at all prices, will be sent free to any address.

There can be no claim of deception or misrepresentation here. The house is above any suspicion of bad faith or unfair dealing. They undoubtedly believe all they say and are abundantly able to make good all they promise. They do not give anything away, but sell very cheap, and make much the same assertion as the other, and hold forth the same inducements. They will teach them all about it, so that they can make good photographs easily in a short time. "Any one can take pictures now." Any person of average intelligence can make good photographs with only ordinary care. "Boys and men are taking money right and Money, in capitals and heavily underscored, showing, like the postscript to a lady's letter, the gist of the whole matter. That would seem to be rather strange advice to put under the head of "Amateur Photography," for as soon as they begin to make money by photography they cease to be amateurs.

It would seem also a little difficult to reconcile these conflicting ideas with strict justice to both classes of their customers.

If they make good their promises to the amateur they have injured the professional—if they fail to make good the inducements offered, they have deceived the amateur.

But as I have before said, the firm who issue that advertisement are above any suspicion of bad faith, or unfair dealing.

In the equity of business they believe they have in all honor the right to offer such inducements—that they can make good all their promises—and state only the truth in all their assertions, and we know they are in the best possible position to know of the facts, over the widest range of observation.

Their statements then must stand as an exposition by authority of the photographic status at the present time. And granting it is true what a cheerless outlook for the professional photographer.

All the old established dealers sell to amateurs at the same prices as to professionals, and show even more eagerness to supply their wants; while scores of new firms spring up expressly to serve them. They all join in the chorus "Anybody can take pictures now. Buy our apparatus and we will tell you all about it. No care, no trouble, but little labor and cost a'most nothing." "And such sights of money you can make, besides lots of fun." Cheerful, is it not? Sounds to the professional photographers about as funny as the Song of Sacrifice to the Captive in the Fejee Islands, while the cannibals are getting ready to eat him.

Although these business methods may seem all right to the firms who use them, yet we must remember how often in the history of the world, business methods have needed rearrangement to accord with an advancing sense of justice; and now some such thing may be necessary in this new juncture of photographic experience. I would only ask now, if these methods are generally considered right? And if not, why not?

But whether any injustice is being done or not, of one thing I am sure, that all this advertising assertion of how easy and cheap photographs can be made, will have the inevitable effect of belittling the business, if not the art, of photography in the public estimation. It has had that effect already. Even just by reading these constant reiterations in advertisements people acquire a partial contempt for a business that anybody can

do so easily. And it is always sure that any business requiring only ordinary skill and care will never stand high in public esteem or command much remuneration for any length of time. If photography while new, has been an exception in the past, it is not likely to so continue into much of the future, for it is rapidly coming down to its lowest level, financially, and soon the flood of money making amateurs will overwhelm it.

Mutual Benefit Associations may stem the torrent awhile, but it were as possible to sweep back the ocean tide with a broom as to stop the progress of the amateur craze until it has run its course.

There is scarcely a doubt but that, like the tide, it will have its culmination and then recede. But how soon none can tell; and whether to leave the professional field like the shores of the Nile after inundation, fertilized and fruitful for a generous harvest; or like the sands of the seashore from the receding tide, barren and desolate, with only broken shells and torn sea weeds.

If we may judge the future only by the past, who will dare to prophecy the transitions through which professional photography must pass before it can reach a firm standpoint of respect and esteem in the world of society and art.

PHOTOGRAPHY IN ITS BEST ESTATE.

By Gustine L. Hurd, Providence, R. I.

In a recent paper by Mr. Ruskin's successor—Hurbert Herkomer—occur some statements or suggestions regarding the conditions of successful portraiture that may not be unprofitable for photographers to consider.

Speaking of his own methods, he says: "The first essential in the art of portrait painting is to assert your position as the master of your model." Here, at the very outset, is a point where many of us are weak. We cannot all hold the exalted position of Mr. Herkomer, but if we are at all competent to deal with what we are about it surely is wise and not unbecoming to impress upon the sitter the idea that the whole matter is subject to our direction. Many people seem to imagine that the province of the photographer is to furnish a little skill in mechanical and chemical manipulations, but it is they who are to direct all that pertains to the artistic result. They tell you what pose they

want; how much of the figure is to be included; which is the best view of the face, and whether they should look up or down, et cetera, et cetera. They expect photographers to stand around, like a butler, to do their bidding. I cannot help thinking that they have come to assume this attitude because they have found the abjectness that submitted to all this. Now, nothing contributes more to successful work than pleasant relations between the subject and yourself, nor are suggestions to be put scornfully aside; but it needs to be understood that you are the master of the situation. It does not often require any self assertion, but simply an air of knowing what you are about and an assumption that the sitter will readily submit to all that you require.

Mr. Herkomer says further, "My first requirement is to know my man before I am ready to make the least study of him. I must see the best of him and learn to enjoy his society." How unlike the methods of photographers! But nothing is more necessary. We sit a stranger immediately he comes in, knowing absolutely nothing what manner of man he is of, nor even what attitudes are characteristic. You have no more knowledge of or familiarity with him than the shopkeeper who sells him his under clothing. And, furthermore, you are not expected to be long about the sitting, as it will detain him from other business. I think the absurdity of proceeding in this way will one day be seen and realized both by sitter and photographer. Why is it not as necessary for us as for Mr. Herkomer to study our model? Surely if we would represent one at his best we want to know him. The patron gives us so little else that it would seem he might give us a little of his time, and especially when the benefit is chiefly his.

Again Mr. Herkomer, speaking of the subject and his friends, "they want a good likeness, but we must interest the art lover who does not know the subject of the portrait. Photography, good friend that it has been to man, has brought this about. Precious little did Gainsboro, Reynolds and Komney trouble themselves about likeness in their women portraits, for if they had, their Lady Hamiltons would not all have been so utterly different, indeed not recognizable for the same woman."

Mr. Herkomer speaks a little more graciously about photography in this connection than he did in a lecture before an audience under the auspices of the Art Club in this city awhile

back. There he relegated photography to the lower shelf. However, at that time he was talking to people, some of whom he expected to pay him twenty-five hundred dollars for a portrait, and some of them did.

That Mr. Herkomer is an artist of great distinction admits of no doubt, but he evidently possesses some of that scorn of likeness that belonged to the old painters he referred to. But why may not the people who sit for their pictures have a likeness? That there are many subjects who are not picturesque or grand or noble in their presence is quite true, but if a portrait has any office it seems to me that it must first of all be a likeness. It is very desirable to make the most of your sitter, to represent him or her at the best, to find what view of the head gives the best lines and likeness and to secure an attitude that comports with the character of the subject and does not violate the rules of art; but the picture maker, "be he painter or be he photographer," should certainly recognize the limitations of his model. And it is something that portrait painters of the highest rank are admitting that photography has forced them in a measure to do this. Many people who are quite able to have what are termed works of art for portraits are turning to photographic processes because they desire, first of all, a likeness.

It may be predicted that portrait photography is just emerging above the horizon, that large work will be accomplished in the future by an artist who uses a camera, and who knows as much as the artist who uses the brush only, of the principles of art and the requirements of portraiture. Then the photographer will bring resources to his task that will enable him to make something besides a map of his sitter and to give that indefinable flavor to a portrait that photographs now so largely miss.

JOTTINGS.

By Williams R. Kennan, Dublin.

When the front of the camera requires tilting up, which is sometimes found necessary in taking such subjects as lofty towers and church steeples, change the position of the tripod, putting two of its legs in front, and one behind under the focussing screen, any required upward tilt can then be given, without fear that the camera will come smashing down when the plate holder is put in.

For the Landscape Photographer a Claude Loraine mirror is a most useful article in enabling one to select and compose a view. These mirrors are made of black plate glass ground to a curve and are used by French artists.

In the mounting room a Mount Cutter's knife will be found much more useful than the knives in general use. The handle is hollow right through and contains the blade, which is pointed at both ends and is fixed to any desired length by means of a small set screw in the handle.

For Copying or Studio Work, when having to use what is known as a Double Extension Camera, that is, one where the front racks out, and the focusing screen remains stationary, it will be found a great convenience to rack out the front a little and clamp it on to the studio stand with a common screw clamp, instead of fastening the camera in the usual manner; this will allow the base board with the focusing screen to be racked back when focusing, and the front will remain fixed.

THE FIXING OF NEGATIVES.

By Alexander Lanier, Imperial Institute, Vienna.

When alkaline developers, such as pyrogallic, hydroquinone, eikonogen, etc., are used, traces of the developer—no matter how well the plates are washed—will always come into the fixing bath, in consequence of which the latter will gradually change to a brown color. A further consequence is, that the plates will not fix so well and clear as might be desired to obtain brilliant prints.

If application is had before the fixing, to a bath consisting of alum and citric acid, every trace of soda or potash will at once be neutralized and any further oxidizing of the reducing medium will be avoided. An alum bath or an acidified alum bath is also good after fixing, but will not have the same effect.

The application of such acid baths may answer the purpose to obtain clear and handsomely tinted negatives, but the loss of time connected therewith is very disagreeable, particularly for the portrait photographer, aside from the fact that the plates have to be well washed after the acid bath and before fixing, to prevent any sulphur precipitation that will show on the negative.

I have succeeded now in discovering a method by which, when my formula is correctly applied, the fixing process can be excellently executed, so that not only clear negatives without the least yellow discoloration* will be the result, but that also at the same time a hardening of the gelatine film will be attained without loss of time to the negative process.

A solution is made of 250 grms. neutral sulphite of soda in 1000 c. c. of water, and after the same is completely dissolved, 70 cubic centimeters muriatic acid are added. This solution has the smell of sulphur dioxide (SO₂) and should be kept in a well corked bottle.

Of this acid sulphite solution, 50 to 100 cubic centimeters are added to 1 liter of ordinary fixing bath, and this addition is repeated when required.

No sulphur precipitation will take place in this fixing bath and the plates can be fixed directly after developing and moderate washing. After fixing they are generally washed, dried, etc.

In my first publication about this improvement, I called attention to the fact that by similar additions to the fixing baths similar effects could be attained, and several parties at once published methods without mentioning my name; but only by observing the above described proceedings, can those advantages be obtained which I have mentioned and will yet describe more extensively.

It cannot be recommended to mix the fixing bath with sulphurous acid only, because it would oxidize very soon to sulphuric acid, which decomposes the fixing bath forming a milky separation of sulphur. My fixing bath also contains free sulphurous acid, but this at once finds, after its oxidizing to sulphuric acid, sulphite of soda, which, by the liberation of new sulphurous acid is transformed into sulphate of soda without the possibility of a separation of sulphur taking place. Additions of neutral sulphite of soda or a solution of bi-sulphite of soda, to the fixing bath, do not act so well as the addition of the described acid sulphite solution, which contains free sulphurous acid.

A mixture of equal parts of the acid sulphite solution with fixing salt solution, will exercise a considerable reduction on negatives in ten to twelve hours whereby the shadows become

^{*} The principal condition for this is, of course, above all, a correctly composed developer.

[†] Photographische Correspondence, 1889.

as clear as glass. This reduction is preferably done in a covered bath. An addition of a little red prussiate potassium will accelerate matters,

This strongly acid fixing bath, without the addition of red prussiate potassium, is very suitable for the removal of the brown spots derived from the mercury intensifier on badly washed negatives, as also for the removal of the silver spots which arise in printing on sensitized paper or aristotype paper not completely dry.

Finally, I may mention that the acid fixing bath, acts also as a reducer upon silver prints, but the tone of the picture will suffer a change.

EIKONOGEN FOR BROMIDE PRINTS.

By Clement I. Leaper, F. C. S., England.

I cordially recommend a trial of the following to those who find any trouble in getting good results with ferrous oxalate.

 Λ —Eikonogen 90 grains; sodium sulphite 450 grains; water 30 ounces.

B-Pure sodium carbonate 480 grains; water 10 ounces.

Use three vols. A to one vol. B; time exposure correctly and employ no bromide. Wash very thoroughly after development, which should be complete in less than two minutes, and fix in strong hypo.

The prints so obtained will be a beautiful warm black, without any yellow discoloration, and if a little over-dense can be reduced to any extent in Farmer's well known mixture of hypo and potassium ferricyanide.

A SMALL PIECE OF GLASS ROD AS A SUBSTAGE ILLUMINATOR OR CONDENSER.

By R. L. Maddox, M. D., Hon. Fell. R. M. S., etc., England.

Since calling attention in the pages of the British Journal of Photography last year, December 13, to the value of a small piece of glass rod, to be used in the place of the ordinary substage microscope condenser, and offering some additional remarks on the same in the pages of the Roy. Mic. Journal this year, p. 101, I have made some further experiments, a notice of



Negative by H. P. Chandler

Moss Eng. Co., N. Y.



which will now form the subject of a brief contribution to the "Annual."

To those who may not be acquainted with the original articles, it may be advisable to shortly state the chief points. Having tried a short piece of a small thermometer tube, retaining the mercury column, as a substage microscope condenser for a certain experiment—which it is not here necessary to relate—I was led to utilize a small piece of a solid glass rod about one-half inch long, and from one-fifth to one-sixth of an inch in diameter as a condenser. After cutting it from the rod, the ends were ground flat and blackened.

It was then let into a cell with an undercut slot, which embraced it closely in its long diameter, the roughened ends fitting tightly against the thicker ends of the slot. This cell was screwed on to the top of a substage adapter having its own rack and pinion, and used exactly as the ordinary achromatic condenser, the long surface lying in a plane perfectly parallel with the stage of the microscope. It was illuminated either by the flat mirror with or without a bull's eye, or a crossed lens condenser, without the mirror, a microscope lamp being the radiant. Striated or apparently lined objects, as diatoms, were seen by this simple plan with their markings or areas exceedingly distinct. A small piece of rather narrower blue glass rod was also tried, and photo-micrographs were satisfactorily taken by aid of each, also when the white glass rod was made into an immersion condenser by cementing a thin cover-glass on its upper surface.

The rods were also mounted in a capped tube which slipped firmly over the neck of a Kellner No. 1 eye piece, or over an A ocular, using the flat mirror only with daylight, or the bull's eye, or crossed lens with lamp light.

The method of using was to centre the rod by the usual substage centring screws, then work up for the best focus, and then test for the best position or distance of the rod from the eye lens, noting the perfection of the image under various objectives from the one-fifth to the one-twentieth immersion. Naturally this requires care and exactitude. The results were simply surprising and have been verified by more skilled hands than mine.

Since making the foregoing experiment, I may now state that I have ground down a white and blue rod to nearly their semi-diameters and then polished the flat ground surfaces, finally mounting them as above, flat side uppermost—as they could

then be more easily used as immersion condensers. They answered well when used either dry or wet; but the focus being now lengthened, I found it useful to cement by Canada balsam, a flat piece of blue glass on the polished surface of the white rod, and a slice from a thick cover glass on the blue rod. The blue rod with the Kellner ocular, flat mirror and sunlight, showed clearly with a one-twelfth water immersion, the horizontal strice of Amphipleura pellucida.

I have also mounted in the same way a small rod which is ovoid in its cross section; this likewise furnishes another useful form, but the images appeared somewhat pale. The round rods can also be used when the exactly central upper surface is blocked out by a narrow line of black varnish, also with a right angle prism instead of the flat mirror. A figure is given in the R. M. Journal of the rod as set in an adapter, but preference is given to the form used over an ocular. Either the rod or the object must be rotated to find the angle most suited to the markings on the object; an angle of ten or fifteen degrees usually furnishes good results, provided attention has been paid to the other necessary points.

The rod also well defines stained and dry unstained bacteria. The convergent line of light is sufficient for the one-twentieth objective, though more light can be obtained by placing a thin meniscus of about three inches focus between the mirror and field lens of the ocular. Possibly the rod might be improved by selecting appropriate flint and crown glass rods, halving, polishing and cementing the surfaces together, but this would destroy its simplicity and costlessness.

In selecting a rod for experiment it is advantageous to hold the rod vertically towards the light, a straight bar or line intervening, then to rotate it and note the perfection of the reflected image; then to hold the rod before a window and look down through it towards the floor, and reject those portions that show any scratches or bright streaks in the body of the glass. A small diamond rod would, perhaps, furnish the best results. The rod need not be of greater diameter than to furnish a length of focus sufficient to reach the object through the usual thickness of an ordinary slide,

COPYING ENGRAVINGS FROM BOOKS.

By Edward Manser, Peekskill, N. Y.

The old *lichtpaus*, or Fox-Talbot process, is constantly bobbing up in some new and unexpected way. Here is a new application which will be useful to many, amateur and professional alike.

I have long wanted a method for reproducing portraits and engravings from books and magazines without the tedious work of drawing by hand, or the bother of copying with a photographic apparatus. The Fox-Talbot process has come to my relief. All that is required is a piece of clear glass, a printing frame back, half a dozen photo clips and a piece of sensitized paper.

If the picture to be copied is the frontispiece of a book, the manner of procedure is as follows: Take the piece of glass and place it at the back of the page on which the engraving is printed, then place the sensitive side of the paper against the face

of the picture and back it up with two or three thicknesses of newspaper; on this place the printing frame back (or two pieces of smooth board will do; they should be as nearly as possible the same size as the page of the book), and fasten the whole together by snapping the clips over the edges as in the cut.

This should be placed in the sun to print, the same as an ordinary negative. When it is necessary to examine the print, it can be done by removing the clips from one-half of the back, thus enabling the operator to get a good look at the paper; print deep—it is very unlikely that you will get the negative too deep. When the print is sufficiently done, tone and fix in the usual way and dry between blotters. This is the negative. An indefinite number of prints may be taken from this, by placing it in a printing frame on a piece of glass and proceeding as in ordinary printing.

If the negative after drying should contain reddish spots, rub it over with a tuft of cotton moistened with alcohol.

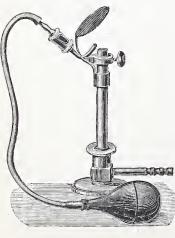
This process, of course, can only be used when there is no printing on the back of the engraving.

A NEW MAGNESIUM LAMP.

By Dr. Adolph Miethe, Editor Photographische Wochenblatt, Berlin.

There is a great variety of magnesium lamps in the market, but the really good and useful ones are scarce. Most of them consume the magnesium powder too slowly or incompletely, so that a considerable quantity of it passes the flame without being consumed. The reason for this, is, that the magnesium powder passes the flame too quickly, or that by an impracticable construction of the blowing arrangement, a cold flame channel will form, within which no combustion will take place. But aside from this, most of the lamps have the defect that the magnesium flame does not expand sufficiently. This flame is completely opaque, so that only the light radiating from its surface is of any effect. It is of no consequence for the light effect, how much powder is consumed, but the space upon which it is consumed has to be considered. The power of illumination is in proportion to the flame.

Taking all the circumstances into consideration, I have now constructed a lamp, which, in competition with several other



lamps at a test made, furnished the largest volume of light with equal quantities of magnesium to each lamp. The principle of the lamp can be easily recognized in the drawing. The flame of a Bunsen burner is diverted sideways by a slanting piece of sheet copper, introduced into the flame in such a way that a very extended fan shaped flame is formed; the magnesium powder is blown sideways through a small tube, is partly consumed by the lower flame, comes in contact with the edge of the copper disk, and is completely consumed

while passing the fan shaped part of the flame. The flash is short, but very intense, and a few centigrams are sufficient for one exposure.

It is advisable to have only one, or at the most two lamps, behind a tissue paper screen, for an exposure. The shaded side is sufficiently lit by the reflection from the walls.

For bust pictures, the lamp should be placed 1.90 meters above the floor; the most preferable objective, is a rapid portrait lens with medium diaphragm; a dark screen protects from colored side light.

FLASH LIGHT PHOTOGRAPHY.

By Dr. Manly Miles, Lansing, Mich.

In looking over the literature of flash light photography, there is evidence of a remarkable and radical change in the methods that have been developed in the brief period since its first introduction. Instead of the dangerous explosive compounds, in quantities of fifty to one hundred grains in thick glass lanterns, or other cumbrous devices, to prevent accidents from the shock of the explosion, or annoyance from offensive gases, and complicated screens or reflectors to secure sufficient intensity of light for a well timed plate, we now have comparatively simple lamps for burning a few grains of magnesium powder, that are easily managed; and with the most sensitive plates, and improved process of developing, over exposures are getting to be the rule rather than the exception.

With this marked progress in the development of the means of lighting; there is, however, one difficulty in its application to portrait photography that prevents the more general adoption of the process, when it might with advantage be used.

In quite a large proportion of cases, there is a tendency in the sitter to an involuntary dropping of the eye lids, or, to assume a fixed staring expression of the eyes to meet the expected glare of the light, that is far from giving a pleasing effect in the finished picture.

With a little management, this defect may be readily obviated, with the average subject, but with sitters that are very sensitive to the action of the light, the exercise of some skill in posing and lighting, will be required to obtain satisfactory results.

When a room is darkened by turning out the lights, just before the exposure is made, a staring expression of the eyes, will, almost without exception, be the dominant feature of the result; but when the sitter, in a subdued light, looks towards the lamp with the expectation that a bright flash will soon be made, there may be a staring expression from a fixed effort to resist the effects of the light, or, the eyelids may drop, by a purely reflex action at the instant of exposure.

The obvious and most efficient remedy for both of these effects, is to have the room well lighted, (which can have no appreciable influence on the plate, for the short time the cap is removed from the camera) and the attention of the sitter turned to some other object than the immediate vicinity of the camera and the flash lamp. If the sitter is looking towards, not at, a bright lamp, or gas jet, on the opposite side of the room, that is not in the range of the camera, the eyes are less likely to be affected by the flash, particularly if it is not expected or posed for.

Any suggestion that may direct attention to the impending flash should be carefully avoided, and with judicious management, the exposure may be made when it is least expected.

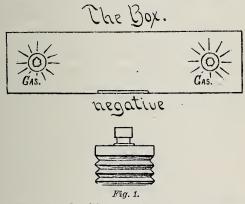
From my experience thus far with my multiple magnesium lamp, small, divided, charges of powdered magnesium, burned simultaneously, give better results than the same, or, even considerably larger amounts in a single lamp, and with the other precautions which have been suggested, the eyes of the sitter have a more natural expression. In the rare cases in which there is an excessive sensitiveness to the effects of the light, a side view of the face may be necessary to give a satisfactory expression,

Greater skill and judgment must be exercised in the management of the flash light to get the best effects, than is required in daylight, but the many cases in which it may be successfully used, when other means of lighting are impracticable, must make the study of the best methods of obviating its inherent defects, a matter of general interest.

A SIMPLE NEGATIVE ILLUMINATOR.

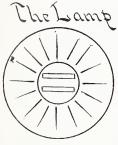
By G. G. Mitchell, Edinburgh, Scotland.

A newly contrived "Illuminating chamber" for enlarging and lantern-slide making by artificial light was exhibited at "our club" the other evening. Its performance was quite successful in illuminating the negative evenly, and doing all its inventor claims for it. It merely consists of an oblong box, lined throughout with some perfectly white material, and having an argand gas burner fixed at either end. In one side of the box, between the lights, a square aperture is cut, into which the negative to be reduced or enlarged is set, the illumination being derived from the opposite reflecting white side of the box. A plate was exposed for thirty



seconds and developed with ferrous oxalate quite satisfactorily. I believe the invention is protected, but I question if the principle is original enough to make it worth while, but that is none of my business. The demonstration was complete, that a fair and even illumination could be had without the aid of condensers. I returned home thinking over the matter, and seeing what I considered would be improvements upon what had been witnessed. While busy putting these together in my mind, I found myself looking absently at a duplex table lamp which I prefer to read and work by, and on which is fixed an opal globe of about eight inches diameter. Suddenly, it flashed upon me-"here is the very thing ready to hand, and better by fifty per cent. in illuminating power than the apparatus I have just seen." The opal globe, if the wicks are properly trimmed, is brightly and evenly illuminated, because the glass is pretty equidistant from the light all round. No image whatever of the flames is seen, but there is one uniform glow; besides, it has a double advantage over the box, inasmuch as it presents an illuminated surface to the negative, which is the result of, so to speak, direct, not reflected light; and that again is supplemented, of course, by the curved reflecting interior behind the burners. A simple diagram of each will make this plain. In the box, it will be observed, the weakest light is reflected from the part marked by a cross, which ought instead to be the strongest. The major part of the light is expended at the ends.

I immediately set up my camera, and improvised a negative holder before my lamp, and the result justified my expectations.



I was able to make a good slide in fifteen seconds; but it is not the short exposure which I wish to make a point of, but the substitution of so efficient a means of even illumination for that of expensive condensers, daylight, etc.

The lamp was the suggestion, but the idea may be greatly improved upon by, say, an arrangement of gas jets behind an opal plate of any size, so as to cover, if need be, the largest negative ever required to be treated by artificial light. I have not myself gone into the matter, but I am satisfied that nobody need be at a loss for a good negative illuminator, as a duplex or other opal-globed lamp will not be far to seek, and I do not see how there

negative

can be any patent rights in the matter of its use, or indeed of any other opal screen arrangement.

In conclusion, I may say that I found my lamp illumination increased perhaps twenty per cent. by placing a sheet of white paper behind the globe, large enough to project at the sides in a curved form, so as to act as a supplementary reflector.

I advise the readers to try "Mitchell's opal globe illuminator," and if they find it does what I have described, I hope they will be as pleased as I am.

The electric light in such a globe would surely be all my fancy can paint it.

WHAT IS THE MATTER WITH DRY PLATES?

By Harry Platt, Nantucket.

Several years ago it was claimed as one of the great advantages of gelatine dry plates that they could be kept after exposure

for a year or more, with safety and then developed. But within a few months I have frequently noticed that attention was called to the fact that it is not best now to allow too much time to intervene between exposure and development.

I have frequently kept them two or three months from one operation to another, and never hesitated about doing it. Recently, however, I have encountered a difficulty which makes me more cautious. Whether it is owing to the wet Summer just passed or not I cannot say, but certain it is that if I attempt now to keep a plate longer than a day or two after exposure, it flattens out and shows evidence of overtiming. This experience can date no later than September, the time of writing, whether the winter will have any different effect, remains to be seen. The plates of several prominent makes were used, so the trouble was not confined to one kind. Now what is the matter; what makes this difference in plates as they were made and as they are now?

In May, 1883, I exposed on the Public Buildings in Washington a number of plates of the old Beebe make, and they were temporarily laid away in their boxes, back and face together with nothing between, to be carried to my destination in another part of the country before developing. These were developed into good negatives afterwards from time to time, as the opportunity offered, with the exception of one box, which got separated from the others and lost. About fifteen months ago I was overhauling by daylight some boxes containing negatives, when I opened one and turned the contents into my hand before realizing that it was a package of undeveloped plates wrapped in one thickness of thin white paper. Of course they were returned to the box and shut up as quickly as possible; but the mischief had been done, for the thin paper was no protection from the light. Not being able at the time to remember what these plates were, I took them into the dark room and tried several; five or six of those at the top and bottom of the package were too badly light struck to show whether they had ever been exposed in the camera or not; but two of those in the middle made good negatives and proved the plates to be the same which were supposed to have been lost. Three of these plates were returned to the box and kept for future experiment. On September 16th, 1889, six and a quarter years from the date of exposure, one of the three was developed and produced a

negative of the Capitol, not perfect by any means, but better than some developed at the same time, which had only been kept about ten days. The lines in the six year negative are all sharp, with no evidence of spreading, and there is good contrast, quite as much as was in the original lot; but apparently between this image and the glass the whole plate is thickened with fog, and distributed all over the film are spots which seem to be the result of decomposition of the gelatine. Whether the fog, which seems to be only on one side of the film, was caused by light at the time they were accidentally taken from their box, or is the result of a continuation of the chemical action which the original exposure in the camera began, I have no means of finding out, but I am inclined to think it is from the first cause because this fog is much thicker around the edges than nearer the centre, and it would seem too, that if it was a chemical change which proceeded or spread from those parts of the negative acted on by light in making the image, the sharpness of that image would, in a great measure be destroyed, and the whole have a blurred appearance, but it has not, and with the exception of the spots which I am inclined to attribute to mildew, it is a much better negative than any I have been able to develop lately after keeping them a week or ten days.

AMATEUR PORTRAITURE.

By Daniel P. Reed, N. Y. Camera Club.

I used to think that it was an easy matter to take one's picture. Circumstances have prevented my indulging in landscape or outdoor photography, and so I thought, why not try portraiture, and I turned my attention to that. My little experience has changed my mind, and I find it the most difficult of the different branches of the science.

One must be to a certain extent a student of human nature, as well as possessing a large amount of patience, and an "artist" will study the subject by a few moment's conversation to get his points for a characteristic or natural picture.

The only change from the regulation style of portraits, that I think outside of lights and shade would be desirable and effective, is, that the sitter should stand, resting the hand or hands on a convenient chair, and so giving, as I have found, a different,

but good effect; it helps one, I think, to be relieved of that settled expression, and makes, in my mind, a more animated picture.

Sometimes an amateur will be disgusted on the return of his pictures, if he sends them to a photographer for printing, to find the long face shortened and the round one lengthened, and wonder how it occurred. It was so in my case until I was told about the stretching qualities of the paper, according as it was cut.

To completely discourage an amateur, let him attempt babies or children of a tender age, and if the conceit is not taken out of him then, he is above the average. I am speaking now of conditions generally attending amateurs, such as side or poor lights or house work, where they do not enjoy the privileges of a skylight of good dimensions. Some are the happy possessors of one, but as a rule, the enthusiastic amateur works at a disadvantage. In my little experience I find good likenesses taken when the subject made no previous arrangements for the trying ordeal, but sat just for fun. It is then that an advantage can be taken which will, if improved, give good results.

What a mistake many make regarding retouching. I claim that it was never meant to make over an entire new face, but simply to take out defects in plate, and, if necessary, to soften lines or wrinkles and not to obliterate them entirely, as I have noticed has been done with some pictures I have made, changing the character and expression, and rendering the picture unnatural.

ON THE MAKING OF LANTERN SLIDES.

By Geo. W. Reed, San Francisco, Cal.

The apparent revival or renewal of interest in the subject of the Optical Lantern has led me to write a few words on the subject of preparing suitable slides therefor, from one's own negatives at home.

While favoring wet collodion, as being not only the cheapest process but that giving the best results, I presume that a majority of my amateur brethren will prefer to make their slides on the commercial gelatine plates prepared especially for that purpose.

Such plates are to be purchased of the dealers, coated on fine extra thin crystal glass, of the standard size of 3½ x 4 inches.

The emulsion having a sensitometer register of from ten to twelve (Warnecke). These plates will be found to give results quite as good as wet collodion if properly treated. If the slides are to be made by contact, place the lantern plate, film side next the negative, in an ordinary printing frame and expose to the flame of a lamp, say about ten to twenty seconds, according to the density of the negative, at a distance of eighteen inches from an ordinary sun burner and develop. If the exposure has been properly timed, the image should begin to appear in about ten seconds. Continue the development slowly, restraining with a ten per cent. solution of potassium bromide if necessary, until the detail is plainly visible in the high lights, and fix in fresh hypo solution of the usual strength.

If the negatives from which it is desired to make the slides are of larger size than $3\frac{1}{4} \times 4\frac{1}{4}$, I strongly advise that the slides be produced by reduction in the camera. The method of so doing is exceedingly simple and consists in merely photographing the negative, the resulting image on the lantern plate being a reduced positive or transparency. Any lens used for making the negatives will do for the purpose of reduction. In my practice I have a window in my work room, eighteen inches square, in which I place a frame for carrying kits of different sizes, ranging from 8×10 to $3\frac{1}{4} \times 4\frac{1}{4}$; in this way all light, except what comes through the negative, is excluded from the room. In the proper kit I place the negative, and on the ground glass of my camera I have drawn a small square, corresponding to the size of the opening in the lantern slide mats used for mounting. I focus sharply and then insert a lantern plate in the plate holder and expose.

I find that with a north light on a bright day, the exposure averages about twenty seconds, the lens being moderately stopped down. The plate is then developed, fixed, cleared and washed as above.

Now a word about developers. I have tried them all of course. Ferrous oxalate pyro-soda, pyro-potash, hydroquinone, etc., etc., and while, perhaps, the best results are to be obtained with Ferrons oxalate, provided the exposure has been correctly timed, I have at last settled upon our new friend, Eikonogen, as the best developer for the purpose, for several reasons, among which are the following:

1. The deposit of metallic silver is exceedingly fine, equaling Ferrous oxalate.

- 2. The operator is allowed considerable latitude in the time of exposure.
 - 3. The developer may be used over and over again.
 - 4. It is cheaper and cleaner.
 - 5. It does not stain either the plate or the hands.

I give below the formula I use, and I think any one who will give it a fair trial, will agree with me that it will do all that I claim for it.

SOLUTION A.

Sodium sulphite crystals	32 grains.
Eikonogen "	8 grains.
Water, ice or distilled	1 ounce.

SOLUTION B.

Sodium c	arbonate	crystals	72 grains.
Water, ic	ce or disti	lled	1 ounce.

For use, take three parts of A to one of B.

Now, a word about density. A slide, to be perfect, should possess every gradation of tone from the highest light, which should be clear glass—otherwise there will be a lack of brilliancy in the whites of the picture, when thrown on the screen—to the deepest shadows which should be slightly translucent, so as to avoid intense blackness on the screen.

An excellent way to test a slide, is to lay it on a piece of clean white paper, and if the highest lights or whites of the picture show the slightest veil or discoloration, the transparency should be condemned. The shadows should not be blocked up by over development so as to be opaque. It is a fallacy, without doubt, to suppose that a slide must be made denser for use with the lime light—a good slide will show equally well on the screen with either the oil or lime light—and I believe my brother photographers, who have had experience with the lantern, will bear me out in this assertion.

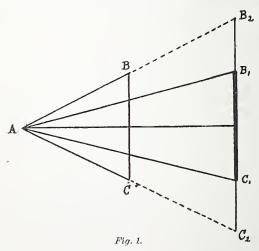
In conclusion, avoid negatives with very strong contrasts of light and shade, they will not make good slides. Your good negatives, those that make good prints without any dodging, will make the best slides. Give a full exposure, develop slowly. Use the clearing solution recommended by the makers of the plates after fixing and wash thoroughly and well; if you fail to obtain the best results, try wet collodion.

A MULTIPLE CAMERA.

By E. W. Rockwood, Iowa State University.

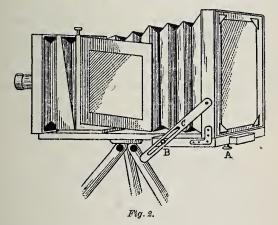
A large camera or a small one, which is the more desirable? That is a question which is warmly debated by amateurs, though without the advocates of either size being apparently able to convert their opponents to their way of thinking. We hear, on one hand, of the delights of the camera of small dimensionsnothing larger than 4x5; of its portability and consequent ease of handling; that one is not obliged, when he only wishes a small picture, to transport a large box and holders filled with kits, but can put his holders in his pocket and, with his camera under his arm, can roam about at his own sweet will. And then it is so easy to enlarge a picture if it is desired. The advocate of the large camera, on the contrary, looks with disdain on anything less than 8x10, saying that the large picture is so much superior to the little one that the extra expense and trouble are more than repaid and if only a small one is wanted the waste of a large plate can be avoided by the use of kits.

Amateurs, as a rule, are not given to limiting themselves to one



piece of apparatus if they can have several, and, in the hands of many of the fraternity, cameras, lenses, and shutters increase and multiply in an astonishing manner. Dallmeyers cannot be obtained for a song, however, and the expense prevents many of us from having a set of different focal lengths, fitted to corresponding boxes, but we are compelled to make one serve as many purposes as possible. We all know that we can, by using only one combination of our doublet lenses, make a lens of greater focal length. If the two combinations are of the same focal length we have, say in a 5½-inch lens, two combined lenses of eleven inches each, one of which can be used alone giving a longer focus, but a reduction of angle if the same sized plate is used. The angle, however, is not reduced if the size of the plate increases with the focal length. The following diagram may show this more clearly (Fig. 1).

A represents the centre of the lens and B C the side of a fiveinch plate in focus. If the length of the lens is doubled the plate must be drawn back to B, C, and the angle is reduced one-half. If we continue to use the five inch plate we gain only in being able to vary the focal length of our lens, but if our plate could



grow with the cone of light as it recedes from the lens or if we substitute a larger one we shall be able to take a picture, B_2 C_2 , twice as long or four times as large as the first one.

It occurred to me several years ago that my camera might be thus made to do double duty and I have since been rejoicing in a camera which would make an 8x10 picture and which could be in a few seconds reduced to a 4½x5½, gaining in lightness as it

lost in size. In its original form it is a 4½x5½ amateur camera with a 5½-inch double combination lens and the increase in size is effected by working with the back combination of the lens and adding to the bellows a cone extension, to the larger end of which an 8x10 holder can be fitted (Fig. 2).

The small ground glass, I have hinged to the side so that it may swing out of the way. The frame of the smaller end of the cone is exactly the size of the small plate holders and fits on to the camera in the same way, so as to make a light tight joint. It is supported at the back end on a board which slides back and forth at the side of the bed to allow of focusing and when this is accomplished it can be fastened firmly to the bed, by the screw A which passes through a brass plate above and below the bed. The back swings from the bottom and is fixed on either side of the camera by a screw with a milled head, B, passing in the slot in C. The extension is very quickly attached by slipping it on over the bed and hooking the smaller end in the place of the plate holder.

I have thus practically two cameras without going to the expense of purchasing them. If I wish for large pictures and there is no difficulty of transportation I take the larger one; if I am going on a long tramp the extension is removed and only the small one is taken. I may add that I did the work myself with the exception of making the holder, and that the whole cost was about two dollars.

IS RETOUCHING AN ART?

By Bruno Saemann, Muhlhausen.

If we seek amusement during our leisure hours, by submitting the work of different galleries to a severe criticism, we will have to direct our eyes not only to the degree of external elegance, but also to the inner value of the same. If we look at a portrait with the eye of an artist, the first question will be, "Has it expression?" Unfortunately, we discover, generally, that the character (the expression), by irrational retouching, not only lacks improvement, but that the little which was characteristic in the picture has been totally ruined by excessive retouching.

An expressive portrait, as the artist requires it, cannot be obtained at one sitting, but has to be composed from different

pictures, one reason more for preserving the existing forms in retouching.

But the expression itself is a problem to many artists, which they cannot solve correctly; how much more must it be a problem to the retoucher, who in general has not gone through an academical training.

Being also a fact, that artists, who are capable of giving expression to the picture, are talented by nature; why should there not be photographers possessed of the same nature's gift, capable of furnishing richly expressive pictures, which, by judicious retouching, can even be improved.

But in the latter, the photographer will only succeed if he has studied the fundamental forms with regard to their capacity for changes, just like the artist talented by nature. The artist has to be thoroughly acquainted with the anatomical construction of the bust and the whole human body, and the photographer has to do the same thing if his work shall bear the stamp of art. The retoucher must have a knowledge of the different parts of the human frame in their form and character, at least as much as they are externally perceptible, as the general proportions depend upon this with each individual.

Although many positions, in a certain sense, may invest the figure with life, on account of the anatomical construction (in a dead condition everything depends upon the law of gravity), the finesse of the whole, is more or less in the soft fleshy parts covering the frame. In the frame, lays the foundation of more or less handsome proportions, which are completed afterwards by the soft or fleshy parts.

The photographic retoucher should, therefore, school his eyes in such a way that he can find easily, the ideal proportions peculiar to each portrait, but he has to be careful not to endanger the likeness of the picture by going too far. He is, of course, allowed some liberty in the change of forms, shading or rounding off, but the characteristic part of the features must not be removed.

All this requires a thorough knowledge of the human frame, muscles, skin, formation of its wrinkles, the hair, dress, etc., as well as their relations to each other. The bones form the rigid fundamental forms of the head and the several limbs; the muscles change according to defined rules; movable parts of the bones are taken into sympathy, they determine further a change of

the wrinkles of the skin, so that the latter will again obtain a natural position and depth. A change of the wrinkles of the skin by retouching, requires, therefore, an exact examination of the support of the same, which also would have to be changed correspondingly, as, otherwise, the work would be nothing but that of an ignoranus.

If the retoucher wishes to know how his portraits should look, he may study the old master works of portrait painting, compare them with life, try to find the several anatomical parts of the same (the attentive searcher will easily succeed), and then it should be his aim to employ the same principles that were applied by the talented artist; he should idealize with moderation and intelligence the natural anatomical form, as represented in life.

If the retoucher wants to know "how to idealize in the form," let him study the classic work of our sculptors, they are the most complete representation of ideal human figures, and unsurpassed. Not only are the several anatomical parts, shown externally on the human body, but there will also be found a wonderful purity of form, connected with the most noble expression,—the aim of all retouchers, but scarcely to be reached,—no matter how complete the model has been.

We cannot, therefore, recommend sufficiently to the photographic retoucher, the study of the anatomical construction, of at least the bust, and the application of the same to his work. This is the only way to furnish satisfactory work to the artist, and this way of working has also the agreeable advantage, that the idealizing of the form can be executed to any desired degree; from the crudest realism, to the most noble idealism, without fear that the expression of the face becomes unnatural.

Finally, the retoucher should guard against too strong a realism or too sweet an idealism, and the several parts should not be too sharp nor show too great an abundance of softness.

The former gives an old and sinister look to the person, the latter a sickly appearance. Moderation on either side is always the best

IRON PROCESS.

By Thomas Scotton, England.

As some of my time is occupied in copying line subjects, etc., perhaps a few experiments I have recently made with some of

the paper I frequently use may be of interest to some photographic brethren. In the first place, I procured a piece of well sized paper and sensitized it with the following preparation;

Gelatine	1 part.
Perchloride of Iron	
Tartaric Acid	1 part.
Persulphate of Iron	-
Water	

My first trial was to place a piece of the sensitized paper in contact with a negative in a printing frame. The result was, when printed and developed, another negative print.

I next procured a transparency, treating this in a similar manner to the negative, the result being a fine positive print; but I found that everything was reversed, viz., the finished print was a reversed picture. The more the copy is printed the fainter will be the impression, which is not the case with most printing processes; therefore, to obtain good results, correct exposure must be given.

Development is effected in the following manner: Gallic acid, one part; water, 160 parts. When dissolved, immerse the print and let it remain in developing solution until all detail is out; then wash in clean water for a few minutes; finally, hang up to dry, or dry between blotting paper. The picture thus produced is, when finished, a fine purple black.

PHOTOGRAPHY AND THE DRAPER MEMORIAL.

By Professor Coleman Sellars, E. D.

A wonderfully attractive lecture delivered by Prof. Pickering told the story of the work on the Draper Memorial. The fluent speaker carried his hearers, first to the Observatory of Harvard College, and briefly but forcibly described the photographic apparatus used to map the stars and record the spectroscopic observations of the same stars. He then, by lantern pictures, carried them through the dry and treeless mountains of Peru to the station selected high above the sea to obtain the portion of the heavens where the Southern Cross can be seen.

Each star, apart from the planets of our solar system are but points, no telescope being able to extend any one of these points. They have to the astronomer no extension. To make them more readily seen, a pin hole camera enlarged each, giving fictitious magnitude for the purpose required. The spectroscope, drew each point out into a broken line without width; but by a wonderfully happy thought the astronomers have dragged the broken line sideways over the sensitive plate, and so produced bands with well defined lines, as if taken from planets, having an illuminated surface to reflect light, or like the spectrum of our sun.

Stars differ in brilliancy and in color, but the spectroscope alone shows their great difference. Some, countless numbers of them, seemingly give a band of the same character as our sun, but others are very different, and it is this spectroscopic difference that is to and surely will) add vastly to our knowledge of their construction.

The stars are not one by one observed, but all that fail within the reach of the plate within the included angle of the lens are simultaneously resolved into these spectroscopic bands with their well marked lines.

Geometry begins with the point, without extension; having position only, that point without extension, if drawn out, becomes a line having extension in one direction only. The line without breadth is dragged sideways to produce a surface or a second extension from position only.

The astronomers who are working on the Draper Memorial apparatus are giving an illustration of the fundamental principles of geometry on a grand scale. Just what they are doing can be illustrated thus: Touch the point of a pen to paper and a dot is made—a rude resemblance of the point—draw the pen from its position and a straight or crooked line is produced just as the spectroscope draws the stars' light from a point into a line. If while the ink is still wet we draw a card edge across the line the ink will be spread into a band of color, and a dotted line or one composed of dots and dashes will widen into a crude resemblance of the spectrum bands of the stars, in that case made by so timing the clock work as to prevent the star from impressing one part of the plate only, but permitting the line to travel sideways over so much of each plate as is required to give a band of sufficient width to make it visible.

When listening to the earnest voice of the speaker illustrating the work of Dr. Henry Draper continued after death by his companion during life—one could not but be impressed with a feeling of actual presence of the mind that had builded the labratory in which we were. A lecture in the very room in which that mind's operation had found expression in action; in the room where his work had been shared by the gifted woman who is so earnestly continuing that work, and who bit by bit is piling the accumulated knowledge into a monument far more enduring than any work in metal or in stone, must bring with it a feeling of nearness to the one who was called away from his work so suddenly and so early.

The most wonderful circumstance connected with Prof. Henry Draper's many important discoveries, is the possible continuance of his labor by Mrs. Draper, who had been his companion and co-worker in all that he had done.

Deeply interested as all had been in the photographic work of the elder Dr. Draper, they rejoiced in the continuance of the work by his son. Now that work even is not ended, but is being carried forward, not by one person only, but by all who are acting with Mrs. Henry Draper in their various capacities. A woman's influence is recorded by each and every act of her trusted coworkers.

WAYS AND MEANS.

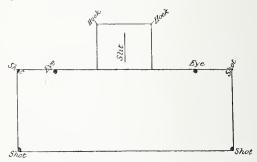
By Geo. L. Sinclair, M. D., Halifax, Nova Scotia.

In my experience as an out-of-door photographer I have met with troubles, to surmount which one had to depend upon his own ingenuity. First among these, was the management of that necessary nuisance the focusing cloth. Every one knows how badly this piece of apparatus behaves sometimes when the wind happens to blow.

We can all recall its propensity to flap about, to get mixed up with one's head and arms or to suddenly leave the camera entirely; and I am sure it tends much to ruffle the temper and tempt one into using somewhat strong language.

The plan I am about to describe, to a large extent mitigates these evils. My cloth is made of dark "fleecy-cotton" doubled, so as to leave the smooth sides out. I have a large size, five feet by three feet and I have it made thus: into each corner there is sewed about an ounce of shot, this gives it weight and keeps the angles and edges from flapping. Then just in the middle of either edge, front or back, a piece is attached, made of the

same material, and exactly the size of the front of the camera. In the centre of the flap cut a slit large enough to permit the lens to pass through and bind the edges of this hole. To each of the lower angles of this flap, have sewed an ordinary large sized "eye"; to a corresponding point on the margin of the main piece is attached on each side, a hook.



When focusing outside, I cover the entire camera with the focusing cloth, pass the lens tube through the slit in the flap, the eye on its angle through the hook in the margin and I can defy a pretty strong breeze to disturb either the cloth or my equanimity.

It is always wise to cover as much as possible of the camera when using it in the open air. There is a risk, unless you do so, of light getting in through some unsuspected opening and fogging the plate.

Focussing screens are also sometimes broken and if this occurs away from home, in some out-of-the-way country town where it is quite impossible to get a new piece of ground glass, it may prove a serious hindrance to the completion of one's trip as originally intended—of course, I have a mark upon my base board indicating the point to which the bellows must be drawn to have every thing beyond, say sixty feet, in fair focus. But I always like to see exactly how much of a view I am taking and so am very dependent upon the focussing screen.

I broke mine into splinters once when "touring" and mended it very satisfactorily in this way.

Carefully collecting every fragment, I wended my way homeward. Reaching my room, I covered the table with a piece of cardboard, placed the frame of the screen upon this and then care-

fully fitted into place every fragment of the broken glass. It was tiresome, patience-trying work and reminded me of the old dissected puzzles of my boyhood. I knew I had a roll of very thin isinglass plaster in my box and I made use of it in this way. Carefully cutting a number of strips, the general shape of which corresponded to the general direction of the breaks in the glass, I pasted them upon the ground side of the screen—when finished, the pieces remained in position and as the plaster was nearly transparent, the result was a focusing glass which served perfectly well and with which I completed my jaunt with very satisfactory results.

Iris diaphragms applied to photographic lenses are a recent reintroduction.

I have a lens with five "Waterhouse stops." If fastened together they would be clumsy so I keep them separate. On several occasions I have lost and found individual members of the group. Once while away in the country I lost, but did not find my favorite one. No metal sufficiently thin from which to make a substitute was obtainable. By the merest chance (!) I was enabled to get an old playing card. Tracing the pattern of the diaphragm by one of those left, I cut out of this cardboard a stop, carefully centered it and with a sharp penknife made a hole of the proper size—a liberal application of ink to the surfaces and edges blackened it and gave me a substitute which served very well until I returned to town and made a permanent one of metal.

The diaphragm slit is a source of some danger, as it may let extraneous light into the camera at the wrong time. This can be avoided by surrounding the lens tube with a rubber band of such a size as to grip the tube tightly. When the stop is placed in the slot the band can be made to press against it and not only prevent leakage, but by its elasticity holds the stop firmly against the tube and so lessens the chance of accidentally dropping it out if you should happen to move about, camera in hand.

A wide-angle landscape lens is a very useful instrument to have with you. To make the one which I use fit the same flange as the Rictilinear which I ordinarily carry, and to avoid the bother of taking an extra front board with flange attached, I have a brass "bushing" made. The thread of the opening and the opening itself, corresponds to the W. A. Lens, and the thread of the outside and the outside side itself, corresponds to the

thread and opening of the R. R. Lens flange—some of these days when we have interchangeable lenses and bayonet joints the whole business of threads, etc., will be dispensed with. Finally, always attach the lens cap to the tube by a string. It is very easily done and may save you losing the cap and being put to serious inconvenience. If some amateur, who has suffered from the various accidental losses which have fallen to my lot, will adopt the precautions which I have attempted to describe above he will be saved a large amount of trouble and annoyance.

TOURISTS' CAMERA CLUB.

Rooms 1022 and 1024. Membership tickets at the office. By " Tramp."

This was posted in one of the best hotels in America, and the story of it was related by the proprietor about as follows: "How did the club become established?" Well, I will tell you. The first year this house was opened, it was as neat and pretty as all new hotels are. One morning the housekeeper called attention to some very badly soiled towels in one of the rooms occupied by a young fellow whom I had seen running about with a photographic apparatus. Soon afterward another room with a camera in it exhibited a great vellow stain in a light carpet. The wall paper in another room gave evidence of a spill, and it made me groan in spirit every time I saw any of my guests with camera tripods in the luggage. At last we had an alarm of fire from one of the rooms and found that the occupant was doing photographic work with a paper lantern. Then I decided I would have a place for these "cranks," and after consulting with a friend who knew all about it, the "Tourists' Club" rooms were fitted up for their use. We provide them with red right, sink, water, trays and a large keg of saturated hypo solution, and it works like a charm. No more accidents in the chambers and the membership fees make that room pay as well as any "second floor front with bath" in the house. I hope some of our hotel men may see this and do likewise. It is good for them and good for the traveler.

PRACTICAL HINTS FROM AN OLD HAND AS TO EXPOSURE.

By W. Harding-Warner, England.

Ever since 1859 it has been the practice of the writer to judge of exposure by the colors presented to him on the focussing screen of the camera rather than by the modern methods of calculation of the focal length of the lens, the rapidity of the plate, or the speed of the shutter, all of which appear to him to be mere adjuncts to the obtaining of the result, and having really nothing to do with exposure in itself. Those who adopt such means act upon the principle that all objects presented to them only reflect white light in its different gradations, while the fact really is, "that all objects absorb white light, and then reflect the same to us according to their own constituents, violet and blue being the highest, orange and red being the lowest, while it is with the ultra rays from these two ends of the spectrum that the photographic image is formed." The equalizing of these two extremes and their intermediaries is the work of the photographer, and his success depends on the skill thereby displayed, and this it is which makes a successful exposure—so that photography requires thought and consideration and is not the mere mechanical thing which some would make it. True that so far we have only dealt with monochrome, but the time is fast approaching when by simple means the relative values of colors will be registered on negatives, to be reproduced again in their proper and natural colors, only fainter than what we see them in nature; as they will not have the power, like the originals, of absorbing the white light and again reflecting it. "Color being made appreciable to our vision from the entire body of the massed pencils of rays, all being of the same value and quality, lying close to each other;" and this occurs with a single leaf or a single flower petal. The atoms of chlorophyl forming such being between an upper and a lower skin which, beside other functions, are of use in protecting it from injury, at the same time allowing a healthy action to be kept up within them.

All things absorb white light which acts on them according to a given law of nature laid down for them at their creation, and oftentimes the color they give off to us in death or in dying, is more beautiful than when in full vigor, so the changes of color which take place are dependent on seasons and temperature, A very wet season producing size with little flavor; very hot and dry ones, height of color and exquisite flavor and taste. For years we have been taking the colors, but we lack the means of reproducing them. We were speaking just now of the equalizing of the extremes of the spectrum, and of this being the means to a successful exposure. To do this at all times is not possible. The days are few and far between when we get equal sunshine and shadow, indeed, the former, beautiful though it be, in a photographic sense, is often very difficult to combat, as by its intensity it eclipses the true ray reflected from the object itself, and gives a dab of white without detail. To surmount this, the writer has for many years used glasses ground optically flat, of a peculiar lemon color; these are homogenous throughout, are of different densities and are used in the cell of the lenses, according to the color and the nature of the subject, extreme whites requiring deep densities, while very dark objects require those of a lesser density, so that while the high lights are kept in abeyance, the darker shadows and foliage become more intense in their reflections and have a longer time for action. By these simple means the writer obtains that wonderful equalization of light and freedom from halation which, while giving clearness of image on the one hand, gives also the relative proportions between the colors on the other, thus having at all times the power of obtaining an orthochromatic effect.

From this we conclude that the future success of obtaining colors as seen in nature, depends in a great measure on this point, and also very largely on a better method of development, and the after processes of fixing and washing; assimilating the same to that pursued in the now almost neglected process of wet collodion, and finally to the printing of the negative, all of which may (if these remarks are received in the spirit in which they are written) form the subject of another paper.

THE STORAGE OF NEGATIVES AND LANTERN SLIDES.

By C. J. Watson, England.

In one's early days in photography the storage of negatives gives rise to little anxiety, they being probably put back into the maker's boxes with paper between them. When, however, they begin to accumulate, especially when one takes large quantities

of photographs for lantern slides and stereographs, the matter becomes more serious. When a friend expresses a desire for a copy of some particular photograph, and one has to hunt through a whole pile of boxes containing good, bad and indifferent negatives, generally with the result of finding it in the last box, the waste of time involved has a very irritating influence on the temper. Many an amateur, from lack of time, puts away the finished negative, which he has taken so much trouble to secure, without printing from it, and afterwards feels unequal to the task of looking for it again. If, however, some of the leisure hours of the Winter be employed in the way I will endeavor to describe, it becomes a pleasure instead of a task to find the wished for negative.

I make it a rule to obtain, as soon as possible after a negative is dry, a print from it on albumenized paper, in order to judge if I am exposing and developing properly. These, if good, are pasted into an album which my friends, especially non-photographers, are permitted to inspect. The others are put by themselves into a "chamber of horrors" for future reference and instruction. Each negative as taken is numbered in the note book, and this number is put under the left hand corner of the print. When time permits the negatives which have accumulated during the Summer are gone over, and on all those of any value a small gummed label is put (not pinned as was suggested in the last annual) at the back of the plate and of course up in one corner on the sky, or somewhere so that it will not interfere with the picture. The negatives can now be placed in numerical order on their edges in wooden boxes, which can be obtained for a trifle from any grocer. I may mention for the benefit of English readers, that Reckitt's-blue boxes and Hudson's dry-soap boxes are respectively the sizes for quarter and for half plates. A piece of blotting paper should be placed between each negative, and if the boxes are not quite filled it is very easy to select any particular negative by turning them over until the right number meets the eve. Of course the numbers of the negatives contained in the box are marked on its end. The label on the negative also practically ensures the use of the right side of the negative, an advantage not to be despised in the dark room when printing lantern slides. This periodical overhauling of one's negatives has a very beneficial action in the reduction of the stock of useless glass, which can be better utilized as covers for lantern slides. For these latter, the same system with very little more trouble, serves to keep them in order. On each slide, in the proper corner to serve as a guide for its right insertion in the lantern, is stuck a small gummed label, on which is a num-This same number is put under the right hand corner of the print in the album, and the slides stored by fifties in the before mentioned blue boxes. When it is intended to give an exhibition, it is only necessary to look through the album and note down the numbers under the pictures selected, and the slides are found without any loss of time. The same numbers also serve to catalogue the slides in a book, wherein is given any interesting information concerning the pictures; and which information is too long to put on the slides, although, I think, the name at least of the subject should always be put inside the glass, as otherwise the slides become comparatively useless in the possession of any one other than the maker. For this reason I prefer to make my slides 334 inches in length like the French ones, and this has further the advantage of preventing an exhibitor from putting them into the lantern sideways. A further precaution which I have recently seen is to draw a streak of white paint across the edges of the slides; so that, when they are put ready for the lantern, any break in the line shows at a glance if a slide has been turned round. In this way the expense of grooved boxes may be avoided, and if a strip of cotton wool be passed round under and over the slides they will carry safely under all decent treatment. They will, however, require unpacking some time before the exhibition to let the slides assume the temperature of the room, as otherwise they will become covered with moisture when placed in the lantern. In these days of metal dark backs and cameras, I wonder that no one has introduced a metal racked frame to fit inside a plain wooden box, and which would hold the slides in much less space than the wooden racks, and could be lifted out bodily and put in a warm place to ensure the slides being warm enough to prevent the said deposition of moisture. I make a present of this idea to some enterprising optician.

HOW TO PHOTOGRAPH STAINED GLASS WINDOWS, OIL PAINTINGS, ETC.

By S. B. Webber, England.

Orthochromatic photography is a subject of increasing interest, and a great aid to obtaining color values. The following method will be found very efficient for copying oil paintings or interiors of churches with stained glass windows, without any sign of halation:

The Plate.—Select a plate with a hard film and not liable to frill. Also one that will stand ammonia without producing fog. Mawson & Swan's ordinary fulfils these conditions.

Stock Solution .--

Erythrosine, 90 grains dissolved in pure alcohol, 6 ozs. Add Liq. Ammonia, 1 drachm.

Bath.—{ Stock Solution as above, 1 drachm. Liq. Amm., strong, 1 drachm. Distilled water....6 ounces.

Dyeing the Plate.—To dye the plate, pour the bath solution into a clean dish (glass preferably), then immerse the plate in sufficient dye to well cover it. Rock it gently for one minute (a little longer in cold weather), then rinse the plate in distilled water and set on edge to drain; finish drying in a dark cupboard or drying box.

N. B.—The dye or bath solution may be used over again and again.

Backing.—To prevent halation back the plates. A simple and efficient method is to paint them with umber moistened with glycerine, then india rubber cloth is pressed upon the backing, to keep the dark slides clean.

The screen is best of yellow glass (optically flat) placed inside the lens tube close in front of the stop. Collodion stained with aurantia is good, or yellow gelatine will do. Exposure for oil paintings with medium stop about thirty minutes; stained glass windows ten minutes; flowers five to seven minutes. By gaslight no yellow screen is required.

After exposure, remove the india rubber cloth, and a damp cloth or sponge will easily take off the umber.

After long exposure a bath of bromide of potassium, one ounce in twenty of distilled water is good for about fifteen seconds; drain the plate a little before development.

Development as usual, pyro and ammonia. Care must be exercised not to keep the plate unnecessarily exposed to the ruby light. Yellow is not safe.

ON LANTERN MATTERS.

By H. H. Williams, Liverpool, England.

Amateurs often say when asked why they don't make lanternslides from their negatives, "Oh, I can only get a bit by contact, and to reduce them requires an expensive outfit and has to be done in daylight." I think a good reply to this is to describe what I use (evening being my only time for this work).

Most of my negatives are 8½x6½, so I utilize my large camera for reducing them in. The camera being placed on a steady table, some four or five feet long, is opened, the ground glass removed from the focusing screen and the negative (film side inwards) put in its place.

A small button is useful to hold the negative safely in position.

A small camera that will take a lantern plate is now put on the table with the lens pointing through the opening in the front of the big camera. Care must be taken to raise the small camera so that its lens is opposite the centre of the large plate.

A box with one side knocked out, and an opening large enough for the negative to be reduced, will do just as well as using a large camera.

The focussing can be done by placing a good lamp about six inches from the negative, and see you get the picture dead sharp. To expose, take a piece of ground glass larger than the picture you are copying (I use the screen from my 10x8), and place it about one inch from negative. When all is ready, and the slide drawn in the small camera, get about two feet magnesium ribbon, put your dark glasses on, get a white dish or piece of opal glass for a reflector, light your ribbon and move it slowly about so as to give every part of the picture an even illumination.

Don't let it be still one moment, or a mark will show. For a very thin negative keep the ribbon farther away; if very dense, you may need four feet or more of magnesium.

It is very easy to print any part deeper if required. I or-

dinarily use the "Mawson" lantern plate and the following developer:

Citric acid, 5 grains.
Bromide potassium, 10 grains.
Hydrokinone, 60 grains.
Sulphite of soda, 120 grains.
Hot water, 10 ounces.

Mix well, leave till next day and filter. Common washing soda is put into boiling water until no more will dissolve. It is then put away until the next day and well filtered.

Equal parts of the two above solutions are used for development.

I find this developer works just as well as the more powerful alkalies, and does not stain the plate; it also suits most bromide plates well, particularly for full exposures.

Most slides are cleaned and brightened up by a dip in an acid-alum solution, care being taken to well wash before fixing.

The following old formula for fixing and toning in one bath I find works very well with "Alpha" and other chloride plates:

Chloride of gold, 1 grain. Phosphate of soda, 15 grains. Sulphocyanide ammonium, 25 grains. Hyposulphite of soda, 240 grains. Water, 2 ounces.

When using an oil lantern to exhibit with, see that the outside of the lamp is perfectly clean and free from oil, else there will be a bad smell. Also be sure the wicks turn up and down easily when the lantern is closed.

If using the lime light, see that the regulators fit the cylinders and that the tap does not leak when fully opened. This is best tested by placing your finger on the outlet of the regulator and turning the cylinder tap full on; there should not be the least escape.

If you hire the cylinders from a dealer, make him try this in your presence, as I know from bitter experience you must rely on *yourself alone* in these matters.

These remarks of course apply to the compressed gas, and I take it no one who has used cylinders would willingly go back to bags,

If going to a room you have never worked in, if using a "blow through" jet, be sure you have plenty of tubing.

In conclusion, no matter what goes wrong,

"Don't get excited; Keep perfectly cool."

If you keep quiet you may see a way out of the difficulty that you most certainly would not if you got in a "tare."

OUR MODERN LENSES.

By Dr. H. W. Vogel.

Our photographic lens system grows from day to day more complicated, it seems. The time has passed, long ago, that a photographer was contented with one objective. A special land-scape lens was not to be thought of, and if one was needed, then the front lens of the portrait objective was taken out and applied for landscape purposes and also for reproductions. A little distortion made no difference at that time. The purchase of an "Orthoscope"—now almost forgotten—was considered a great move. Truly, those were good old times in comparison with the present, when it is almost impossible to remember all the designations for the new objectives, which have come into existence in the meantime, and are being made yet, and which are recommended to accomplish, heaven knows what.

The old Petzval-Voigtlander objective might have remained the ruling instrument, being in one principal feature for portraiture, the rapidity, superior to all others with the exception of perhaps one. But the invention of the highly sensitive dry plate permits now the working with less rapid instruments, dispensing with the old Petzval in most cases. In its place the aplanatic constructions, due to Steinheil, appear now more in the foreground.

That gentleman, being told during the Hamburg Exhibition of 1868, to make his aplanato (which at that time were comparatively new) more rapid, replied: "The optician has done his duty, but photographic chemistry should now endeavor, to increase the sensibility of the plates," little dreaming at that time that ten years later this problem would be solved. In 1868, the dry plates were still in such a condition that many photographers would shrug their shoulders, and if it had been prophesied



Collotype.

Waterlow & Sons Ltd., London.



at that time, that after ten more years, dry plates would be made at least ten times as sensitive as wet plates, why, such a person would have been considered ripe for a lunatic asylum. But, why the many styles of objectives, some will ask? "Orthoscope, Tachyscope, Euryscope, Platyscope, Periscope," and many with English names, such as "Rapid rectilinear, Symmetrical, Universal, Quick Acting Rapid Cabinet, Single View Lens, etc. Not to think about the French contributions, whose names we will leave out. Is it to be wondered at, if a photographer or amateur of the present day exclaims:

"My head feels heavy, drowsy, dull, As if it was with millstones full!"

Some two years ago a rich amateur, Mr. Seligmann, died here, who purchased everything that he could lay hands on. After his death one hundred and fifty objectives of different descriptions were left by him. Such lentil (lens) porridge, only a rich man can pay for. Seligman did even more. Finding the brass mountings too heavy for him, he had them replaced in Paris by aluminium-metal.

Concerning the numerous lenses mentioned, it should at first be borne in mind, that the same construction has oftentimes different designations. After Steinheil invented his applanat, Dallmeyer copied the same and called it Rapid Rectilinear. He sold it as something new and at a higher price than Steinheil. Even in Germany this instrument met with a ready sale, and I know people who would swear that to possess the same was to own something better than the applanat. Since the expiration of the patent the applanat construction has become general. It has been adopted by all opticians and they reproduce them more or less good and under different names.

In England there is even a lens in the market under my own name, but I must confess that I have never seen one of them. I am just as ignorant about the Tachyscope, Universal and others. The great cost of these objectives, prevents their purchase for the purpose of mere trial and not all opticians offer their productions to the scientist. In vain I have tried to obtain one of these lenses "on trial" from the workshop of Ross, in London. How to test lenses, I have described pretty minutely in my text book. But such tests are not everybody's business; bad mistakes are made sometimes and many really good instruments are condemned. The practical photographer cares only about

the length of focus in comparison with his camera. The opening, he measures very seldom and much less, the visual field. He is satisfied if the objective gives a sharp picture within the limits of his studio, and the desired time of exposure. This practical test has certainly its merits and no objection can be made, that some artist photographers will prefer an objective, possessing a general medium sharpness, to one of very sharp linear expression, and that they do not care about a little "spherical deviation." This is simply a matter of taste.

Optical "finesse" is of not much consequence in portraiture.

This personal test of the lens is finally the best, particularly when there is a great variety to select from. Photographic and optical houses of reputation are generally willing to place several instruments at the disposal of a purchaser, if he is known to them, for trial. Amateurs of course always do best to consult one who knows something about lenses. Many price lists give the desired information and advice (Steinheil, Voigtlander, etc.), but a little optical knowledge is necessary to comprehend them intelligently. If an amateur has a certain plate size, and he desires an objective for "all kinds of work," it is best for him to take a good applanat, whose focal distance corresponds with the size of plate, (to be seen in the price list) and which will furnish sharp pictures to the corners of the plate with the smallest diaphragm. Euryscopes are still more rapid, and can be recommended for instantaneous work. Wide angles (for extended landscape or architecture) are used only exceptionally. Here the focal distance should be only a little larger than half of the plate length, if an angle of 85° is required.

Only the Busch pantoscope will go beyond 90°.

If a cheap objective is wanted, then the single achromatic (landscape) lens should be looked for. They are not always exactly true, and require the diaphragm, but the amateur is generally not so very particular.

A PLEA FOR PYRO.

I—come—again—(Eikonogen).

By Abe Lizzard.

It is an old saying "There's nothing new under the sun," but I begin to doubt it. No, not exactly so, for I began to doubt it as soon as I learned the motto, precept, or saying, whatever you

eall it. I now declare and affirm that where anything is brought to light, from the depths of darkness, and shown on this mundane sphere, for the first time, it is something new, and the sun has nothing to do with it, in the beginning, although without his solar majesty, or the light emitted by him, we should find such substance of no use whatever, in practice, as far as its present application is concerned. In speaking of developers, early last Summer (it is now 1890), I was asked as to whether I had heard of the new article discovered (?) by Andressen called "Eikonogen." The way the word was pronounced was a stunner. In fact, it so discomboberated me, I could not think of developers or anything else for awhile, but try to handle the name of the article. Now, without going through the full history, just call it as if it was spelled "I-kon-o-jen" and let it go at that. If you try the German pronunciation you had better have a surgeon handy and one who is first class on a case of lockjaw. You will need him before you get it, and then wish you had left it alone. I refer to the word and not the article. That is all right, as far as I have gotten along. Well, I have tried it, right and left, long exposures, short ditto, instantaneous and time, on landscapes, scascapes and all other scapes, on the capes on the Delaware and even on old Hatteras, and will give it the credit for being just about as good as hydroquinone, but when you come down to a good old steady, reliable depend-on-him-every-day developer, it is difficult work to get ahead of old Pyro. I see it claimed that this one will not stain, do what you will, and the other is different in other respects, etc., ctc., BUT, when you have got a good reliable developer and one you understand, DON'T give up your hold on your old and trusty one for anything new, because Prof. — with an M.A. or Ph. A., LL.D. or D.D.S. after his name, says that you are all wrong and he is the only one on the right road. Going by deeds and not words, have any pictures been shown since the advent of all these new-fangled, high and hard sounding named developers were brought before the public, that will excel those made with Pyro? Why not get an expression from those who advocate them, as to their experience and which they would depend on in the long run. Once, when in England, I was told by a professional, "We are making dry plates so cheaply now, that you can get a quarter plate (3½x4½) at nine shillings per gross." Just think of it! eighteen cents per dozen for a dry plate packed, with separators, etc. I asked

said party "If you had a job to do in the country where your railroad fare and hotel bill would be as much as £10, to make three negatives or perhaps six, and you could not develop until you reached home, would you take those plates and depend on them?" His reply was, to quote his own words, "Lor' bless you, sir, no. I should not think of doing it with anything short of a-" mentioning one of the highest priced plates quoted in the English market, and sold at fifty per cent. higher than the best in the United States were sold at. Now this goes to show that right in the face of cheap goods, the parties who advocate them or praise the country that produces them, will not depend on them, but prefer to depend on a good well known article that has practical knowledge and experience to back it. climbed up the wrong tree myself. Yes, I acknowledge I did it, hoping to keep some other fellow from doing the same. I went off on a trip and exposed my plates, no, they were films, and although some might say it amounts to the same thing, it does not. Glass is glass (heavy and brittle), but films is films (light and flexible), at any rate I shot with several dozens at any thing I thought might be interesting. My Little Pup (Lilliput) did itself credit, but I did not. On my return I passed by my old reliable Pyro, and, thinks I, to myself, the last time I developed I used hydroquinone, and as it did me splendidly, why not try it again? Well, I began, and as usual took a large tray, poured in developer, about twelve ounces, and then in went the plates, no films. They came up slowly but fairly, and after I had developed about two dozen I made up my mind something was wrong. They did not come out boldly or give me the strength I desired in them for good, strong, brilliant prints. Boldly I washed out the trays and went for the I-come-again. It started out apparently better, but (now here my experience may vary from that of many who use it) it started out elegantly, came up slowly, rich and creamy, but when it reached a certain point it would go no further. I could not drive it, do what I The results were, detail superb, apparent strength, very fair. Printing or actual strength, quite thin. For enlarging, not worth a-well-a cent. I was going to use a big word there, but forgot just what it was the parrot said. It was something that sounded like health, but that could not possibly be what it actually was. Well, to keep on developing, I again cleaned out my trays, fixed some new hypo solution and got down the

pyro. There were the two bottles, mixed in October, 1887. Solution No. 1 and No. 2, the first with the pyro and sulphite and No. 2 with the carbonate. Presuming that your time and space are valuable, I will cut a long story short and say that every one developed with the pyro, was very fine and all I could ask for. When transparencies for the window or lantern are wanted, any developer will answer, ferrous oxalate, hydroquinone, I-come-again or pyro, in about one-half normal strength as used for negatives with perhaps a slight trace of bromide added, but for the quick plate or films, used with very quick shutters, give me the pyro that has always served me well, and although the new comers have for awhile displaced him, and caused him to be laid on the shelf, still he stands there knowing that his voice will be heard, exclaiming, "I come again," and surely enough he comes. Experience will teach us all to bear in mind that "an honest friend is hard to find, and when you've found one good and true, leave not the old friend for the new," unless you find him enough better to make up for the loss. Experiment with all the new things that appear, but do not "lose your grip" on the old reliables. By the way, if you find any one who has lost his grippe tell him I have found it and he is welcome to take it away.

HAWTHORNE ON THE DAGUERREOTYPE.

By W. I. Lincoln Adams, Editor Photographic Times, N. Y.

The present movement in America to honor the memory of Daguerre, by erecting in Washington a fitting monument, is reviving an interest in all that appertains to the process which he discovered.

I wonder if all the readers of THE INTERNATIONAL ANNUAL have noticed the interesting remarks on the subject, which America's great romance writer, Nathaniel Hawthorne, has made, in his characteristic way, in the sixth chapter of that fascinating book, "The House of the Seven Gables."

The young daguerreotypist, Holgrave, is working in the garden of the old Pyncheon mansion; and Phœbe, the gentle New England maiden, has met him there, in caring for her favorite fowls and plants.

Holgrave declares his profession to Phœbe, to be that of a daguerreotypist, to which she replies:

"I don't much like pictures of that sort. They are so hard and stern, besides drawing away from the eye, and trying to escape altogether. They are conscious of looking very unamiable, I suppose, and therefore hate to be seen."

"If you will permit me," said the artist, looking at Phœbe, "I should like to try whether the daguerreotype can bring out disagreeable traits on a perfectly amiable face. But there certainly is truth in what you have said. Most of my likenesses do look unamiable; but the very sufficient reason, I fancy, is because the originals are so. There is a wonderful insight in heaven's broad and simple sunshine. While we give it credit for depicting only the merest surface, it actually brings out the secret character with a truth that no painter would ever venture upon, even could he detect it. There is, at least, no flattery in my humble line of art. Now, here is a likeness which I have taken over and over again, and still with no better result. Yet the original wears to common eyes a very different expression. It would gratify me to have your judgment on this character."

The young artist then exhibited a daguerreotype miniature in a morocco case, which Phoebe, merely glancing at, thought she recognized as the portrait of her Puritan ancestor—so strong was the family resemblance—though it was in reality the likeness of her uncle, Judge Pyncheon.

"To be sure," she said, "you have found some way of copying the portrait without its black velvet cap and gray beard, and have given him a modern coat and satin cravat instead of his cloak and band."

"Yon would have seen other differences had you looked a little longer," said Holgrave. "I can assure you that this is a modern face, and one which you will very probably meet. Now, the remarkable point is, that the original wears to the world's eye—and, for aught I know, to his most intimate friends—an exceedingly pleasant countenance, indicative of benevolence, openness of heart, snnny good humor, and other traces of worthy qualities of that cast. The snn, as you see, tells quite another story, and will not be coaxed out of it after half a dozen patient attempts on my part. Here we have the man sly, subtle, hard, imperious, and, withal, cold as ice. Look at that eye. Would you like to be at its mercy? At that mouth. Could it ever smile? And yet, if you could only see the benign smile of the original!"

Thus it is, that the daguerreotype, not only, but also our

modern silver photograph, reveals the inner character of a man. It is as if the sun could penetrate beneath the surface and depict the spirit there which is not always discernible by the human eye. Many photographers have undoubtedly observed this fact in their portraits, but who, save the great romancer, has described it so vividly?

ON AMATEURISM.

By William Adcock, England.

To me, an old amateur, the British professional photographer in his race for profitable business seems heavily handicapped.

It is pretended by some who damage him that before he commenced his business or bought his business, he must have calculated chances and been prepared for contingencies that have arisen. Alas! the men who most feel the combat with amateurism, and there are thousands such, are those who have been traders for many years and in happier times.

It is pretended by others that as so few trader's openly complain, no grievance exists. My correspondence with men I have never seen, but whose names are widely known, tells a different tale.

They feel acutely the action of pretended amateurs who, while keeping no shop, deliberately sell their work at low prices. Where this is done to eke out an income by a poor man it may be borne, but it is too often done by those who do not need it. To these may be added those inconsiderate persons who give much work away, and with it the impression that it costs so little the sacrifice is small. These people ignore the expensive stuff a trader must keep and, even if only half employed, fully pay.

To these evils no remedy will be got by appealing to good feeling where none exists, but I think the time has come when those who would not wilfully damage others may be appealed to, to act considerately towards the professional photographer, who has ever, as far as I have known, dealt fairly with the amateurs.

To add to other evils the trader is now threatened with a trades union which will fix his rate of wages and say who he shall and who not employ, and which, if he be obdurate, will do his best to ruin him.

May fate prevent me and those I care for from ever becoming professional photographers!

PHOTOGRAPHIC ENLARGEMENTS AS ILLUSTRATIONS FOR SCIENTIFIC LECTURES.

By Dr. Leo Backelandt, New York.

The drawings used in universities or technical schools as illustrations for scientific lectures, are among those things that always give to the professor a good deal of trouble, and as these drawings should be visible to all the students present in the lecture room, their size is rather large and their production by the use of ordinary means is a matter of some difficulty. It is true that many of these drawings, showing sections of machines. industrial apparatus or anatomical and physiological subjects, can now be bought in the trade, but their price is still high. is really discouraging to the owners of all these drawings, that after having collected a complete set of them, it happens often that after a very short time they must be changed or modified. in order to keep them abreast of the ever progressing science. have seen whole collections of drawings representing chemical apparatus as used for industrial purposes and drawings of physiological subjects, which had been the result of years of labor and the pride of their owners, and which are now without interest, as the subjects illustrated by them are all of a past scientific period. But photography has made all easy and cheap, and it is the simplest thing in the world to get, in a short time, a regular collection of these drawings. For that purpose, negatives are taken from the prints out of the text books or the scientific journals as soon as published and enlarged on bromide paper. Everybody knows that this can be done without any other apparatus than the ordinary camera, transformed into an enlarging The negatives should be white and black, with good contrasts, without fog. Collodion negatives answer very well for this purpose, but dry plates can be used just as well if they are of good quality, and especially when made with a very slow emulsion, giving much density, and developed with hydroquinone developer. Beautiful enlarged drawings have been produced in this way on bromide paper. As this paper gives pure blacks and whites, it should be used for this kind of work in preference to all other.

DRY PLATE DEVELOPMENT FOR BEGINNERS.

By Robert E. M. Bain, St. Louis, Mo.

Very few beginners in the fascinating pastime of photography have opportunities of seeking information from those more advanced. The professional is usually too busy to devote the necessary time, and hence the embryo amateur is handicapped in his efforts to obtain the instruction necessary to put him on the right path.

The explanations given in a majority of the books dedicated to the beginner, embody a series of instructions relative to the camera, lens and focusing cloth, while the real difficulty—that of development—is treated so ambiguously as to admit of a variety of constructions, thus affording every opportunity to go wrong and one chance in twenty of going right. The experience of a number of years in instructing beginners, has led the author to believe that a few simple words of advice in the matter of dry plate development would be of material benefit to those who must to a large extent depend upon books for instruction.

First, let us take up the matter of exposure. The stops or diaphragms should be examined and their relation tested. Stops that can be relied on to double the exposure with each size smaller, are almost a necessity, as it is then only necessary to estimate the time of exposure required for the stop generally used, to be able to calculate at once the time required for each succeeding stop in the series. We will suppose that a stop equal to, say 44, has been used (opening equal in diameter to $\frac{1}{4.5}$ of the equivalent focal length of the lens) and the time of exposure onefourth second on a brightly lighted view. Now, naturally, unless he has had long experience in such matters, the beginner has no idea as to whether the plate exposed has been overtimed or undertimed. This is only ascertained when the developer has been flowed over it in the dark room. That the uninitiated may obtain some knowledge of the visible effect of the chemicals used to develop the plates, the following brief explanation will be necessary: Pyrogallic acid has a great affinity for oxygen and reduces the iodide or other salts of silver to the metallic state, hence it is the pyro that gives blackness or density to the negative. The alkali used in connection with pyro, as a developing agent increases its affinity for oxygen and thus hastens the reduction or development. The alkalis generally used are ammonia, carbonate of soda and carbonate of potash. By increasing the amount of the alkali used, the development is materially accelerated, and the under-exposed portions of the landscape which would otherwise remain as clear spots in the negative are fully developed. Should an excess of the alkali be added, the reduction takes place very rapidly and produces what is known as fog. Bromide, diminishes the affinity of pyro for oxygen and retards the development. Sulphite of soda is used to prevent the decomposition of the pyro in solution. The visible effect of this decomposition is to turn the developer brown, staining both the fingers and the negative. Beyond this the sulphite cuts little or no figure in the development. With this brief explanation, we will proceed to the manner of development.

Into a graduate containing two ounces of water, dissolve thirtytwo grains sal soda (crystals) and fifty grains of sulphite soda -(crystals). When this is dissolved, eight grains of dry pyro should be added to complete the developer. At a temperature of 60° a properly timed plate should show signs of development in twenty-five to thirty seconds. Should the image begin to appear before fifteen seconds, a small portion of a solution of bromide of sodium (bromide ten grains, water one ounce) should be at once added, as the plate gives evidence of overexposure. Should the image not appear, however, until fortyfive seconds have elapsed, instead of bromide, add more sal soda solution of the same strength as made up for development, as the plate has been under-exposed. Where it is suspected that the plate is undertimed to any great degree the developer should be made with warm water, which will of itself increase the reducing action of the solution. This class of plate requires a developer containing only two grains of pyro. to the ounce, in place of four grains. A bottle filled with the bromide solution should always be kept near at hand in case of an emergency. The size and shape of this bottle should be decidedly different from all others in immediate use, that no mistake may be made when development requires its aid. When the plate shows no sign of development, at the end of one minute make up a fresh solution consisting of sal soda sixteen grains, water one pint, lay the plate in this for half to three-quarters of an hour, when, if the detail is brought out, place it in a normal developing solution to finish. Do not make the mistake of exposing a dozen plates to practice on, but expose one and when you have done

your utmost to make a satisfactory negative without success, expose another giving more or less time as you find from development the plate requires.

Practical knowledge of development consists mainly in remembering the action of the chemicals contained in the solution. Pyro gives density or blackness, sal soda gives detail and bromide gives contrast. By keeping this constantly in mind the beginner is at no loss to know what to add to the solution to secure the effect wanted.

ABOUT THE IMPROVEMENT OF THE STEREOSCOPE.

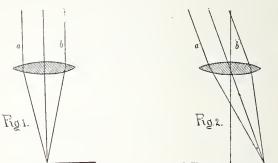
By H. Goltzson, Berlin.

The Stereoscope, at one time so enthusiastically received, has lost its prestige almost entirely in Europe at the present time. The cause of this is evidently not to be ascribed to the fundamental idea, upon which this instrument is based and which will always remain attractive, but to the want of design and careless application of the idea. And this want of design again has its reason in the insufficient realization of the true principles, upon which the correct construction of the stereoscope must be based. Regardless of the number of persons who have already handled the stereoscope for the sake of improvement, and no matter how much has already been written about it, with and without mathematical analysis, the one main and cardinal principle, upon which depends everything, has never been pronounced clearly or distinctly. The following will distinctly explain it:

If we look with both eyes simultaneously through a large convex lens at a picture placed at the proper focal distance, as in the well known panoramic apparatus, we will see the objects represented in the picture so large and apparently distant, that they appear to us exactly as in nature. The reason for this appearance is simply, that the rays, diverging from every point of the picture, are refracted by the lens after well known optical principles in such a way, that after their passage through the lens they will form a bundle of parallel rays of the full diameter of the lens, as shown in Fig. 1., for a point in the axis, and in Fig. 2 for a point outside of the axis.

The eyes, situated close behind the lens, of course cannot absorb this whole bundle of rays, but each, only a very limited

part of the same corresponding to the diameter of the eyeball. But as the whole bundle of a certain picture point is parallel in itself, the two small parts thereof, which strike the eyes, a and b,

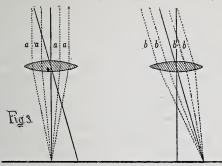


as designated in the cut, must also be parallel to each other. These eyes receive therefore from each picture point, the rays exactly as if coming from an infinitive distance, and the result is, that we imagine that we have nature before us and not a picture. The eye axes becomes thereby just as parallel as in viewing distant objects. They do not have convergence any more, which they would have when looking at the picture without a lens; and this convergence is what produces the impression of nearness and smallness.

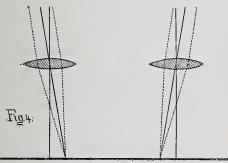
To obtain now a similar effect from the natural size and distance by means of the stereoscope, we have to provide on this instrument, also for the parallelism of the eye axis. But, while the above described single lens will produce this parallelism of itself, as soon as the picture is placed in the proper focus, it is by no means the same with the double pictures and double lenses of the stereoscope. For this it is required (and this is the main principle, upon which everything depends), that the true optical centres of the lenses or their axes have exactly the same distance from each other as those corresponding points in the double pictures, which belong to the distance of the objects represented. Only under this condition the bundles of rays reaching the eyes will become just as parallel to each other, as in the case of the single lens previously mentioned.

The truth of this principle is at once perceptible by looking at Fig. 3, showing the radiation for one point in the axis as well as

for one outside of the axis; in one lens the straight and in the other the oblique bundle of rays being designated by dotted lines.



Within these large bundles of rays the eyes may have their position at any place without their obtaining anything else but direct bundles of rays from every point of the objects represented, as shown in the cut by repeating the letters a and b designating the eyes. This demonstrates also the important conclusion, that it is quite indifferent what distance from each other the eyes may be placed in different people and how incorrect it is to connect this distance with the construction, although it has been done many times.



The following, Fig. 4, may show that the eye axis becomes convergent, if the corresponding picture points are nearer to each other than the optical centres of the lenses. In such a case, therefore, only the impression of nearness and smallness can be given exactly contrary to what is desired.

In the correctly constructed stereoscope, exists therefore an accurately determined coherence between the distance of the optical lens centres from each other and the width of the picture by which we will designate the distance of the corresponding picture points belonging to the distance. As the lenses, as well as the pictures, can be brought into any number of varied distances within admissible limits, and the theory demanding only analogy between lenses and pictures, the absolute measurement which is to be given from the width of the picture and the analogous width of the lens centres, is therefore left to discretion.

Any number of equally correct stereoscopes can therefore be constructed with suitable pictures; but it is incorrect to view a picture of a certain measurement through a stereoscope which is not suitable for the same.

This is done daily, and it is just the cause of the present imperfection and the decline of stereoscopic work, a branch which seems to be called upon to form one of the most important parts in the photographic business. To regain its former reputation it is indispensably necessary to stop the confusion caused by the many arbitrary sizes of the stereoscopic pictures (that is the picture width) and this can be done only by adopting and introducing one uniform size. The arrangement of the apparatus can afterwards easily be determined accordingly.

For further details about this subject I would like to refer to an article written by me in Dr. Eder's year book for 1890, under the title: "The Transformation of the Stereoscope a Necessity." In the same I made the proposition which gave rise to the present article: To bring the corresponding prints of distance in the stereoscopic pictures unalterably to a distance of seventy-seven millimeters, having found this to be the most agreeable measure after a careful and practical study, and it may be here repeated, purely for practical and not theoretical reasons. The latter furnishes no law for this.

HINTS ON COPYING.

By Geo. H. Hastings, First Vice-President Photographers' Association of America.

This article is not intended for those who have had years of experience in the art, but to assist those who are starting in the work and have perhaps experienced many failures, knowing of no remedy for the same; it has also been prompted by noticing employés proceed in an entirely different manner from that which I practice. If you have a ferreotype which is dirty, scratched in the varnish or rubbed on the surface and copy it as it is, it will look badly in the reproduction. Let us obviate the difficulty by rubbing it with a piece of canton flannel moistened with kerosene oil, which will give a cleaner, smoother surface to work from. When the background is badly scratched, it can be painted out with Chinese white, then copied, and a vignetted picture made which, even if the paint is not smoothly applied, will nevertheless be more pleasing. The paint can be easily removed by holding under the tap. I have often seen an attempt made to copy a ferreotype, ambrotype or daguerrotype in a weak light and the result has been a flat and characterless reproduction; had they been placed with the sunlight falling upon them, or reflected sunlight by means of a mirror on the same, we should have had a much stronger and more pleasing copy. Many photographs with a rough surface, the fibre of the paper being quite plain, or with infinitesimal cracks, if placed in the strong sunlight will have an exaggerated coarseness. A good way is to put them under a clear glass in a printing frame [thus insuring perfect contact], and if placed in rather a weak light, the result will be smoother and more satisfactory. I have found in such cases the use of a small diaphram beneficial, as it gives more brilliancy and better quality. In copying crayon portraits, instead of getting an especially sharp focus, throw the lens a little out of focus, they will be softer and more satisfactory. Any large picture to be copied should be placed at an exact right angle with the camera.

Old daguerrotypes are nicely cleaned with a weak solution of cyanide of potassium. Apply by wetting the surface under the tap and then pouring the cyanide solution over carefully and, after thoroughly washing, dry by holding by means of pincers over a spirit lamp.

Old faded albumen prints, after being soaked off from the mount and the adherent paste removed, can be cleaned with a solution of one part bichloride of mercury to 1,000 parts of water. Dirt is easily removed with polishing wax. Glycerine poured over a photograph and the print then pressed behind a glass, gives to old prints a smoother surface.

When the original is very small and in bad condition, a great

help in focusing, is, to moisten a piece of newspaper and apply to some part of the picture, and focus on the letters. By simply arranging a picture to be copied, without making use of many little dodges which time and experience may suggest, you will never get the full benefit of what may be accomplished.

If the above hints prove of any value, or can be applied by any one, to better improve their work, the mission of this article will have been fulfilled.

INDOOR PHOTOGRAPHY AT NIGHT.

By Geo. A. Haynes, Jersey City Camera Club.

In response to your request for a contribution to the Annual, I will say a few words about indoor photography at night, because there are doubtless many enthusiastic amateurs who, like myself, are compelled to spend the day in earning the wherewithal to buy bread and butter, and if the relation of my experience will enlighten others as to what may be accomplished without sunlight I shall feel that your space and my time have not been wasted.

In calling attention to photography at night, I shall refer particularly to the use of gas or kerosene lamps as the sources of light. Of course, magnesium powder for instantaneous work at night is the thing, but its disappointments are many. For instance, it is to say the least disappointing, if not discouraging in the extreme, after making one exposure after another of grandma with the baby on her lap, both looking their sweetest, to get nothing but failures. You use up a box of plates and about an ounce of powder; you get soundly berated by the mistress of the house for getting the place full of smoke, which cannot be got rid of without opening windows and doors, thereby getting the full benefit of the blinding snow storm then prevailing, for your special comfort—all for what as a result? Why, the amiable old lady looking at the child as if he were an apparition which had startled her out of her seven senses, and the unfortunate youngster a picture of the most abject terror.

My first experience in photography at night, without magnesium powder was with two ordinary kerosene lamps. As a member of the Jersey City Camera Club I was expected to furnish some slides for the first lantern exhibition of the club. After

making some slides from negatives I had by me I was anxious to reproduce two or three interesting engravings, &c., in lantern slides, but as my vocation of a shorthand reporter leaves me no spare time during the day, I thought I would try it at night, and this is how I did it. On a table close to a wall of the room, a drawing board was placed on its edge and resting against the wall; on the drawing board was pinned the picture to be copied. About a foot in front of the drawing board were placed two kerosene lamps, one on each side of the board. The camera was an ordinary 5x8 Anthony camera, with vertical swing back; the lens a very old Darlot one-quarter plate portrait, which I bought for a few shillings in London; it had not been designed for stops, but I had cut a slit in the barrel for that purpose and made a set of stops to use with it. The camera was supported on a tripod; the focusing was done with the full opening of the lens and then stopped down. Working with f-64 stop and ten minutes' exposure, using Carbutt twenty-seven or Seed twenty-six plates, the results were equally good. I ought to say, that I developed with eikonogen, which, as far as my experience goes, is the most satisfactory developer. With some subjects I found five and even three minutes full time, while others required more than ten minutes even.

Encouraged by my success in copying I thought I would see what I could do in portraiture by lamplight, as before, and two gas burners. I will omit going into details of arrangement of sheets of paper for reflecting purposes, etc., as they will readily suggest themselves. My first trial was with the same lens, using f-16 stop and one minute exposure, and I was rewarded with a satisfactory negative. Some may think it is not possible to take a portrait at night by lamplight in sixty seconds; to those I say, do as I did,—try it.

RETOUCHING PORTRAIT NEGATIVES.

By W. J. Hickmott, Hartford Camera Club.

It is not a matter of great difficulty to learn to retouch a portrait negative. I do not mean by this that anyone and everyone can learn to retouch nicely, but the principles of the art as practiced in most portrait studios, can soon be acquired, and if one is adapted to the business, and has the necessary patience, a few months will enable them to arrive at a good degree of proficiency.

The great trouble with most retouchers is, that they do too much. They not only soften all the lines of the face and remove every spot, but they obliterate every characteristic of the face, and it is no uncommon thing to see a person of fifty or sixty with a face as smooth as a sixteen year old school-girl. The retoucher is not to blame for this entirely, as the great majority of people demand this excessive obliteration. They do not like to see wrinkles at the corners of the eyes, and all traces of the march of time must be smoothed away and the dial of life turned backward for a space measured only by the retoucher's skill.

The first essential is a proper frame for holding the negative. This can be purchased already made at the stock house, or can be easily made with a couple of pieces of board and a few nails. The manner of construction is so simple and well known, that I will not enter upon an explanation here. All that is required, is, that it shall be of convenient height, that the light shall come only through the negative, and that all side and top light be cut off from the retoucher.

After the frame is made, go to some professional or amateur friend and get a number of portrait negatives that have been discarded for one reason or another. Varnish with negative varnish, and set aside to dry, and harden thoroughly. When the varnish is entirely dry it will be necessary to roughen the surface to be retouched in some manner, in order to make the pencil take hold. If it is left smooth the pencil will refuse to mark. Ground pumice stone is as good a material to use as anything. Take a pinch of the powder and put upon the face, on the varnished side, and gently rub it around and around until it is evenly roughened. Put the negative upon the retouching frame and cover with a piece of cardboard with a hole in it just large enough to show the whole of the face to be retouched. Take a metal pencil, and with a file and a piece of fine emery paper make a good long, fine point, and then you are ready to go to work. On looking at the negative it will be seen that there are lines around the eyes, in the forehead, from the nose to the corners of the mouth, and from the corners of the mouth down the chin. Usually there are heavy shadows under the eyes, and if the eyes are deep set. there will be a good deal of shadow under the eyebrow. There will be seen also many light spots, some large, some small, and a good many that do not show at all when looking at the person direct, but which show very plainly in the negative. The lines

and these light spots are the only parts of the negative which should receive the pencil. Put the point of the pencil right in the centre of a light spot and give it a very gentle and almost imperceptible rotary motion, and the spot will disappear. Then go to another, and so on, until all the spots are gone. Then take the lines and soften them, but do not entirely remove them. Lines are best removed by following their direction with the pencil instead of the rotary motion used in obliterating a spot. The lines under the eyes should be almost entirely removed, also the lines running from the nose to the corners of the mouth, but the lines in the forehead should be left enough to show very slightly in the print. Be exceedingly careful not to go outside of the light spots or the lines with the pencil. All that is to be done in going over the face the first few times, is to bring the light spots to an even color with the rest of the face. After all the spots are removed and the lines and shadows softened as much as may be desired, the face will still have a sort of patchy look. There will be quite large spaces that are lighter than the rest of the face. The cheek bones may be too strong and prominent and the high light on the nose too intense. The face must then be modeled by blending these light spaces with the darker portions. This is done by holding the pencil very lightly and going from one light space to another, back and forth, never taking the pencil off from the negative, until the light spaces are filled up even and graded into each other, and the whole brought up to a harmonious shade. If the light is too strong on the nose it must be lowered by bringing up the shade on the cheek, especially on the shadow side. Always bear in mind, that if you could retouch a negative enough, that is, if it would take lead enough, it could be retouched until the face was entirely flat and every feature removed. If the light is too intense in any one part it can be lowered by bringing up the part adjacent to its shade. If the nose is not prominent enough, it can be strengthened with the pencil, and quite a strong light can be manufactured. It is best to leave the eyes alone. They usually need no treatment at all. Lights can be put in with the pencil if desired, but with proper lighting there will be enough life and light in them. It is well to take a proof of the negative before commencing work upon it, and when it looks as though it was done, another proof should be taken and compared with the first one. If the proof from the retouched negative shows any

imperfections they should be remedied. If any part of the face is too strong, the rest must be brought up with the pencil, until a good soft even effect is obtained. Of course the first negatives retouched, will be far from perfect, and many will have to be done before the novice gets the hang of the business, and gets so that he or she can see when a negative looks patchy, but with experience, this ability to see what needs to be done will increase until finally one readily dicerns defects that were not at first apparent. Great patience, a light touch, careful discrimination and good judgment are the essentials to good retouching. these, almost anyone can learn the art after the standards set up in the modern studio. Large work requires different treatment from small. It must not be so fine, but more free-handed and sketchy. It is much more difficult to retouch large heads, and the beginner should confine his first efforts to heads of medium or small sizes.

It sometimes happens that a negative cannot be retouched enough, because it will not take any more lead. It should then be revarnished and roughened as before, and the second retouching will probably be sufficient. Great care must be exercised in retouching on this second coating, as the varnish is very liable to flake up, especially over those parts which were heavily leaded at the first retouching.

BLUE PRINTING FOR AMATEURS.

By Professor Charles F. Himes, Ph. D., President Dickinson College, Pa.

This subject sounds simple and trite; and yet it is one of considerable importance, if regard is had simply to the numbers practicing it, or to the commercial value of the product. But an experience of nearly twenty-five years with photography, in its various processes, as a regular laboratory exercise for students, as well as with exclusively photographic schools, assigns it a high value as an educational agent, and in promoting rational wider photographic practice.

A few years ago, when first called upon to conduct a Summer school of photography, it was made a most gratifying success, both in numbers and in the enthusiasm and progress of the students, in spite of many unpromising conditions, by giving

blue printing a prominent place in the announcement, and making that process the first of a series of progressive courses of practice. No one can fully realize the fascination of this simplest of all photographic processes, as well as the resources it furnishes for instruction, until he has seen it properly presented to an assemblage of two dozen of persons of average intelligence, and for them made introductory to all the elementary principles of photography, to the characteristics of negatives, to printing manipulations, and to that photographic sense upon which subsequent processes may be based. Whilst many were tempted to try what seemed certain of success, and did succeed, the success, owing to the minimum of direction and supervision required by the process, seemed much more exclusively their own than that by some more complicated process; and there is nothing like success, and especially independent success, to whet the appetite for higher practice, and to inspire the measure and kind of confidence so necessary in many cases. But in spite of the simplicity of the process, there is still just enough of possibility of failure to emphasize, at all stages, what is meant by photographic care, photographic cleanliness, and photographic thoughtfulness; and a collection of blue print failures, such as could easily be made by any one, with an explanation of their causes, would not only be highly interesting and instructive, but would be more numerous than, without reflection, would seem possible. The comparative harmlessness of the reagents employed, and their inexpensiveness, as well as the variety and extent of its applications also recommend it as an introduction to practical photography. But my own blue-print correspondence, rather voluminous, and the columns of inquiry, in other than purely photographic journals, indicate the lines along which failures and consequent discouragement have occurred, and frequently the advice given does not accord with my own experience. Without going into any details as to modifications for special purposes I call attention only to a few fudamental facts.

First—Paper. More stress has often been laid upon the quality and sizing of the paper than is warranted, possibly to the discouragement of some. Any good, firm paper, that will not absorb the solution, and which will retain sufficient toughness in the subsequent washings will answer. Any plain photographic paper in the market, sold in sheets 17x22 inches, may serve as a standard of comparison, but any good writing paper, as a rule,

will answer equally well, especially unruled cap. If heavier paper is desired, the various grades of drawing paper can be used, and for the largest prints, as of architectural plans, the heavier, specially prepared paper, kept generally with supplies for engineers, is to be preferred, more particularly by reason of its toughness and retention of surface when wet; but the writer has had such plans of largest size, on paper five feet long, printed in the laboratory on ordinary light colored heavy manilla wrapping paper, ordinarily used by him for lecture diagrams. Some very inferior grades of writing paper may yield specked prints, and some samples of paper, whilst furnishing satisfactory prints when freshly coated, do not seem to yield a prepared paper of as good keeping quality. Exceptions such as these will soon be discovered by the amateur, and be discarded.

Second—Sensitizing Solution: Among the many formulæ given, varying slightly in the proportions of the ingredients, and all as a rule yielding, with proper manipulation, satisfactory results, the following has approved itself as a good standard for all work:

Dissolve separately and completely, then mix thoroughly in the dark, and keep the mixture thoroughly excluded from the light by wrapping the bottle in black cloth or in yellow paper, or what is still better, by putting it in a stoneware bottle, such as used for ink. It is unnecessary to filter the solutions separately, but the mixture must be filtered before use, and best just immediately before use, and only as much as may be needed at the time. H allowed to stand for an hour or two after mixing, it will yield on the first filtration a clear, transparent, yellowish brown liquid, which will produce a paper free from blueish marks and streaks, which almost invariably result from a slight precipitate which forms on mixing the solutions, rendering it turbid, a reaction doubtless due to slight impurities in the materials, and which seems to require some little time for its completion. The mixed solution, will keep for months; the writer has used some with satisfactory result more than a year old. All that is necessary is to keep it carefully excluded from the light, and to filter immediately before use, though, with care, a perfectly clear liquid

may sometimes be poured out from a full bottle, after it has been undisturbed for a long time. A very turbid solution need not be thrown away as worthless, but the very slightest turbidity demands filtration. With this remedy for many sources of annoyace in mind, the materials furnished at drug stores generally will be found of sufficient purity.

Third—Coating the paper: This is best accomplished, by the amateur at least, by brushing the paper, pinned by its four corners to a board, with the solution, by means of a tuft of clean cotton, formed into a ball and twistled on one side, so as to be held in the fingers or in a clothes clip. For large pieces of paper a fine sponge may be substituted for the cotton. Floating the paper on the solution, as often recommended, possesses no advantages for the amateur, whilst it demands a large quantity of solution and correspondingly large dishes, thus limiting the size of the work and also consuming more time.

Fourth-Keeping the paper: The prepared paper must be kept rigidly excluded from light; but, with the best of care in this respect, it will lose in sensitiveness and brilliancy with time. Paper carefully prepared, with exclusion of light during its preparation and drying, has shown no inferiority to paper freshly prepared by the preceding formula after several months; and the addition of one part of a saturated solution of bichromate of potash to 200 parts of the mixed solution seems to impart better keeping qualities to the paper, without impairing it in other respects. This, however, is a variable factor at best, dependent perhaps on atmospheric conditions in part or on the quality of the paper and on the degree of exposure to light during the preparation. Owing, however, to the ease with which paper can be prepared, when a ready mixed solution is on hand, and the rapidity with which it dries, this is a very subordinate matter to the amateur, however it may affect the manufacture of commercial paper.

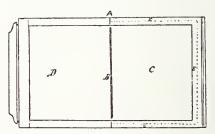
Hints and suggestions as to exposure and selection of subjects might be given that would be helpful to some, but the preceding seem to be the points upon which amateurs meet with the most frequent discouragements, and often with conflicting advice, and they have been touched upon with the feeling that encouragement of the very best results with blue prints by the beginner means, to some extent, encouragement of the very best photographic work with all processes, an encouragement certainly needed in these days, when poor pictures are so easily taken.

DOUBLE POSE PHOTOGRAPHS.

By C. A. Hoffmann, Minneapolis.

Although I am not very handy with my pen, I will make my best effort to explain a kink of making a double pose photograph that often puzzles both amateur and professional, as I get a nice and perfect background in room or in field, as case may be.

I first find the vertical centre of my ground glass and make a pencil line down it at that point. Then I make a similar line for the horizontal centre. These lines I continue to outside of camera. I then insert plate holder and mark it to tally with these lines. I next draw out the slide just one-half and mark it good and plain so as to be easily seen when drawn out half way. I then fill the plate holder as usual, but gum ruby or orange paper on outer or side next to end, where draw slide is inserted. I then pose my subject, say a man at card table playing his last trump. In focusing, I take special care that the vertical line on



- A .- Vertical centre mark on plate holder.
- B .- Vertical centre mark on slide of holder.
- C.—Side of holder covered with nonactinic paper gummed at E, E, E, on outside of holder.
 - D.—End of holder not covered, and on which first exposure is made.

ground glass comes through centre of table and get my subject on that side of the table that will cover plate not covered with the orange paper. Having this all carefully done, I insert plate holder, cover lens, and withdraw the draw slide entirely. I then, before making the exposure, see that my subject has the desired expression and position and make my exposure. After having done this, I again cap the lens carefully, put in my dark slide, remove the plate holder from camera and remove the ruby or orange paper. I take the same person and place him on the opposite side of the table raking in the money, or any other

position, replace the plate holder, and then drawing out the slide one-half only, make the second exposure, giving as near the same time as is possible. This done, I develop as usual. You may then find a centre line over exposed, but if properly done, is hardly to be seen. Should it be too dense, by carefully using a brush and saturate solution of red prussiate of potash, this can be toned down so nearly even that it cannot be seen on print at all. By changing the subjects and positions in the field, as for example, put in a small cart a boy or girl, and proping up the pull stick to the proper height and making the first exposure of the person in cart then the second exposure of same person pulling the cart, it will make a mysterious photograph. This is not exactly new, and still I have never seen it done in this way. All I ever saw use a dark background, which is very simple to do, but the addition of natural scenery and backgrounds are more pleasing to the eye and more effective and mysterious.

ASTRONOMICAL PHOTOGRAPHY AT THE LICK OBSERVATORY.

By Edward S. Holden, LL.D., Mount Hamilton, California.

The editors of the International Annual have kindly asked me for an account of our photographic work at the Lick Observatory, and although (for reasons not necessary to state here) our work of this kind has but just begun, I am very glad to comply with their request, and to give very briefly our experience up to this time.

The experiments so far made indicate that the photographic lens (thirty-three inches aperture, 570 inches focus) will be found as satisfactory as the visual objective, thirty-six inches aperture, 694 inches focus. Both of these were made by Alvan Clark & Sons. The mounting of the great telescope is by Warner & Swasey, of Cleveland, and this also has proved to be very satisfactory. The dome of seventy-five feet diameter (made by the Union Iron Works of San Francisco) with its elevating floor (sixty-one feet in diameter) has worked well, and the latter has proved itself to be almost essential in photographic operations with so great a telescope.

A number of subjects have not yet been touched at all, such as the photography of planets and direct enlargement; and the various difficulties in our other work are not yet all conquered, or even understood, but enough has been done to show that success can be attained. The observatory is very fortunate in counting among its astronomers Messrs. Burnham and Barnard, whose photographic skill and experience is equal to their astronomical ability. The other astronomers engage in the work of exposing and measuring the negatives, but all the photographic work proper has been done by these gentlemen in addition to their other duties.

PHOTOGRAPHS OF STARS.

In astronomical photography of stars we may have different objects in view. We may wish for a picture of the stars merely, or to measure their distances apart; or finally, to determine their photographic brightness. The stars may be photographed as dots (i. e., with the telescope driven by clock work to follow the stars in their courses from rising towards setting) or as trails (the stars moving across the stationary plate from east towards west). In the first case (dots) we secure the impressions of fainter and fainter stars, according as the exposure is longer and longer. In the second case, we shall have no trails from the fainter stars on account of the short exposure. With the great telescope a star on the Equator moves $\frac{45}{1000}$ of an inch on the plate in one second of time, and $2\frac{\pi}{10}$ inches in one minute of time. Hence, only the brighter stars (about 7th magnitude or so) register their trails at the Equator. The stars near the pole move very much slower, and stars of the 13th or 14th magnitude will trail.

To obtain star pictures or maps, long exposures are necessary with any telescope. If the instrument is intended to register the greatest possible number of stars, it should have a focus relatively short. Refractors with a double objective, on the model of a portrait combination, have a great advantage in this respect. The Harvard College observatory has been using portrait lenses of eight inches aperture and forty-four inches focus for this purpose, and is now making a similar lens of twenty-four inches aperture and eleven feet focus. Reflectors are very suitable also, and in my opinion, the next great telescope for photography should be a reflector of large aperture and short focus. Mr. Common, of London, has just mounted a five-foot reflector of this class, and its performance will be eagerly watched, in order to see what work is to be expected from instruments of this construction.

If stars are to be taken as dots, the clock must follow the motion of the stars very accurately, or else the telescope (or the photographic plate) must be moved by hand from time to time to correct the irregularities of the clockwork motion and the small changes in the star's apparent position, due to refraction, etc.

In the Lick telescope, the photographic focus is forty-seven feet six inches. The slightest wandering of the axis of the telescope, or the slightest flexure of the tube, etc., will produce a comparatively great displacement of the image on the plate.

Our driving clock is electrically controlled from a standard clock, so that it goes at precisely the right rate. But we find it necessary to move the plate by hand (by means of two screws at right angles to each other) to correct the minor irregularities of the train beyond the clock, refraction, flexure, etc. A guiding eyepiece is attached to the plate itself, and a guiding star is kept exactly at the intersection of two wires in the eyepiece, by moving a slide which carries both plate and eyepiece.

Such a long focus telescope as ours, cannot produce maps of the faintest stars as easily as such maps can be made by shorter focused instruments. On the other hand, we have an immense advantage in the scale of the picture. 1" of arc = 0.003 inches. 0".01 = 0.00003 inches. It is easy to measure the distance apart of two dots or trails (under a suitable microscope) correctly to 0".03 or so. Hence, the relative positions of stars (or of craters on the moon, etc.) can be accurately and quickly fixed from our negatives.

To detect shrinkage of the film, we impress the image of a reticle ruled in squares, on the negative before exposure, and, on development, we have these squares displayed. A comparison of the squares of the reticle with the squares of the negative will detect distortions of the film, etc. For accurate measures, our negatives must be made on plate glass. The beautiful reticles which we have, were ruled at the Potsdam observatory by Professor H. C. Vogel and Dr. Scheiner.

Thus, wherever scale is of importance, as for measures of parallax, etc., the great telescope has a decided advantage over shorter focused telescopes. A distance of 2000" to 8000" of arc can be measured with a probable error of not more than 0".1 or 0".2.

Trails of stars can be used to measure differences of declination (perpendicular to the trails), and thus to determine parallax, etc.

Trails are also suitable for measures of the photographic brightness of stars. For this purpose, it seems best to give all stars the same exposure, and this can be effected (as suggested by Mr. Schaeberle of the Lick Observatory) by causing the plate to follow the stars in right ascension, but to trail in declination; that is, to make the stars impress themselves on a plate which follows their motion from east to west, but which is also driven by a second clockwork at a uniform rate from north to south. Every star sufficiently bright can thus be compared with Polaris, and the photographic brightness of each star, in terms of that of Polaris as unity, can be deduced.

The same thing can be (less accurately, I think) determined by measuring the diameter of the images of the various stars, and by comparing the diameters of the various stars with that of Polaris on the same plate.

The subject of photographic photometry is a very difficult one both theoretically and practically, and involves a knowledge of the relation between the intensity of the stain on the plate and the exposure time. Captain Abney, whose authority is of the highest, has come to the conclusion that "the deposit of silver made by different intensities of light, varies in density* directly as the intensity of light acting—this, of course, within such limits that the reversal of the image is not commenced, and that the film is not in any part exhausted of the silver salt that can be reduced." Our own experiments on this subject (which are just begun) seem to indicate a somewhat less general conclusion.

As the question is fundamental, it may not be improper to give the conclusions we have so far attained, with the proper reserve, since further experiment may modify the results now apparently reached. For a light of a given intensity, I, for example, it seems to follow from our work, that for very short exposures the density of the deposit D increases very much faster than directly as the time, T. For longer exposures the density D' becomes more nearly proportional to T'; for still longer exposures the proportion again falls off, long before the halation stage is reached.

Thus, for light of intensity I, we have from zero to T'; D varies more rapidly than directly as the time; from T' to T", D varies as

^{*} I understand this to mean "varies in opacity," though I may misinterpret the expression.

the time; from T'' to T''', D varies less rapidly than directly as the time. For light of intensity, i, the density d goes through these three stages in different intervals t' - o; t'' - t'; t''' - t''.

A very important point seems to be that t' is not the same as T'; t'' not the same as T'', etc., but that t varies with i. That is, if the deposit on a given plate is proportional to the time between 5 sec. and 10 sec., for example, for a light i, it will not be proportional to the time between these limits for a light of greater intensity I. For I it may be so proportional between other limits of exposure, as 3 sec. and 7 sec. and so on.

If these results are true, they seriously modify photometric

conclusions hitherto reached by means of photography.

I have been willing to speak at this time of experiments which are still in progress, and whose results are by no means final, on account of the great importance of this question, and in the hope of inciting others to experiment on the same subject.

Mr. Schaeberle has found that if d be the diameter of a star image (dot) taken with a six inch Dallmeyer portrait lens in a time t on a Seed 26 plate, with a diapraghm Q inches in aperture in front of the objective, that we can express this diameter thus:

$$d = A + B \log Q + C \cdot Q \cdot \log t$$
.

A B and C are constants which must be determined for each plate. It is probable, though not proved as yet, that this equation is only true between certain limits i and I of intensity of star light, and between certain limits t and T of exposure time. It has served very well to predict the diameter of over exposed stars.

PHOTOGRAPHS OF SOLAR ECLIPSES.

The solar eclipse of January 1, 1889, occurred soon after the observatory was founded, and before suitable photographic instruments were available. Nevertheless, Mr. Barnard contrived to take most capital negatives with some small cameras, and especially with an ordinary telescope of three inches aperture (reduced to 1¾ inches) and a focus of forty-nine inches. (Seed twenty-six plates were used, and exposures of 1, 3 and 4½ seconds.)

The greatest pains were taken in focusing and in development, and his results are consequently of first class excellence, and comparable with those obtained by much larger instruments, specially adapted for photography.

The Amateur Photographic Association of the Pacific coast

sent a large and competent party to the eclipse under the direction of Mr. Burckhalter, and their negatives were kindly turned over to the Lick observatory for discussion and publication. At this eclipse not only was the Corona thoroughly depicted, but the negatives of Mr. Barnard of the observatory, and of Messrs. Lowden and Ireland of the A. P. A. P. C. (and others) showed a new and very remarkable extension to the outer Corona, never before photographed.

As this "extension" was shown on several negatives taken by eleven persons at four different stations, there seems to be no question as to its veritable existence.

Following the suggestion of Captain Abney and the example of Mr. W. H. Pickering of the Harvard College observatory, the Lick observatory plates were "standardized." That is, a portion of each plate was impressed with the light from a standard lamp shining for a known time through a small hole at a known distance. The lamp produced small squares on the plate, and after development these squares were compared with the different parts of the Corona, in order to measure its photographic brightness.

Assuming with Captain Abney that the stain on the plate is proportional to the exposure, I found the following results, which are compared with those of Mr Pickering in 1886.

	Pickering— 1886.	Holden— 1889.
Intrinsic actinic brilliancy of the brightest parts of	0.031	0.079
the Corona	0.001	0.053
Intrinsic actinic brilliancy of the point rays (about).	0.0007	6.0050
Total actinic light of the Corona	37.	60.8
Total actinic light of the sky	52000.	185625.
Total actinic light of the sky and Corona	52037.	185686.
Ratio of total coronal to total sky light (actinic)	1 to 1400	1 to 3043
Ratio of intrinsic brilliancy of the brightest parts of	1 00 1100	2 00 0015
the Corona to that of the sky (actinic)	44 to 1	16 to 1
(The above results in the second column are from		
Mr. Barnard's Negative C only.)		
Intrinsic actinic brilliancy of the sky at 1° from the		
sun in daylight (avcrage)	40.	
Intrinsic actinic brilliancy of the full Moon	1.66	
Total actinic light of the full Moon (SD = $16'.75$)	1461.5	
Intrinsic actinic brilliancy of sky within 5° of the		
fu'll Moon	0.000064	
Magnitude of the faintest star shown on the eclipse		
photographs		2.3

From this table it appears that the polar rays are about eleven times as bright as the sky; and that the brightest parts of the Corona are 1½ times as bright as the polar rays. Hence the seare usually masked when they are projected upon the bright wings.

The intrinsic brilliancy of sunlight plus Corona (40.08) is $\frac{1}{300}$ part more than the brilliancy of the ordinary daylight 1° from the Sun (40.0). Hence it would seem that the Corona (which has a continuous spectrum) can never be photographed in full daylight on our present plates.

As the planet *Vulcan*? (if any such planet exists) is not brighter than six mag., it follows that we cannot hope to photograph it on our present plates.

The corresponding results from the eclipse of December 21, 1889, are not yet available.

PHOTOGRAPHS OF THE MOON.

Our first experiments in photography with the large telescope were made by Mr. Burnham, on the Moon. As no suitable shutter was then available, the aperture was reduced to twelve and eight inches to increase the exposure time.

The best of these experimental pictures are very fine. Enlargements of them have been made on glass by Mr. Barnard, and I have been able to locate the minutest details of structure on these positives. Parallel walls on the Moon, whose tops are no more than two hundred yards or so in width, and which are not more than 1,000 to 1,200 yards apart, are plainly visible.

In the examination of such pictures there is an immense advantage in using a positive copy on glass (which presents the different features in their natural lustre) rather than the original negative. The same thing is true of pictures of solar eclipses.

In certain negatives many details can be brought out by enlargement, or by reductions, that entirely escape notice on the originals.

PHOTOGRAPHS OF THE MILKY WAY.

Mr. Barnard made some experiments in this direction in 1889, which promise the most satisfactory results. The instrument used was a five-inch portrait lens, and the exposures were 180 to 240 minutes.

It is proposed to photograph the whole of the Milky Way on one scale and with one exposure in this manner.

PHOTOGRAPHS OF NEBULÆ AND COMETS.

Very little has yet been done here in these important fields. A few nebulæ have been photographed for experiment, with good

results. Mr. Barnard photographed Davidson's comet, with a portrait lens and an exposure of ninety minutes. I have compared the brightness of the comet with that of stain on the same plate derived from the light of a standard lamp shining for a known time on the film. If the conclusions of Capt. Abnev. namely, that the stain on the plateis, proportional to the time, is correct, then it followed that the comet was 10,000,000 times fainter than the full Moon, area for area, and that it was 500,000 times fainter than the brightest parts of the Corona of January 1, 1889. The sky near the full Moon is also, on the same hypothesis, 400 times more bright (photographically) than the comet, and 4,000 times more bright than the dark night sky.

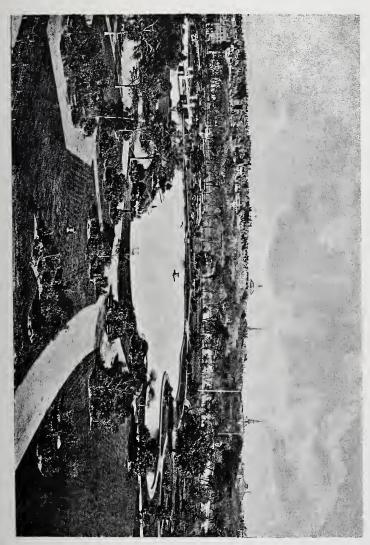
Mr. Barnard's photographs of the nebula of Andromeda, with a portrait lens, are highly interesting, but we have as yet obtained no pictures of nebulæ which are as important as the wonderfully fine impressions of the Merope nebula, of that in Andromeda, or of the great nebula in Orion, made by Messrs. Henry, Roberts and Common, and by the Harvard College Observatory.

The excellence of the great telescope will not be shown by extremely great extension of faint nebulæ, but rather by the very large scale on which these objects are taken. It has its own appropriate field, and within that field it promises admirable results. Many vexatious delays have occurred in making this great instrument ready for photographic use, but it is hoped that during the Summer of 1890 it may be in full activity.

AN ACCESSORY FOR HOME PORTRAITURE.

By Joseph R. Husson, New York.

To amateurs who are fond of taking portraits at home and who have only a side light to work with, I recommend the following simple accessory which they will find very useful. It consists of a piece of gauze or other thin muslin, say two feet long by eighteen inches wide, thrown over a support to make a screen for diffusing the light where needed. I have utilized the lower part of a music stand, into which I have fitted a stick, which may be raised or lowered as desired, and through the upper part of which near the top, I have run a stout wire horizontally, and over this I hang the muslin, using it single or double as required,



PUBLIC GARDEN, BOSTON, MASS.

Heliotype Printing Co., Boston, Mass.



This screen I place between the subject and the window, in such position that it will diffuse the light for the bright side of the face and not reduce it upon the clothing or reflecting screen, enabling me to get a much more harmonious picture.

SEMBLANCE OR REALITY—WHICH SHALL IT BE?

By Frederick A. Jackson, New Haven, Conn.

It is generally conceded that a landscape with figures, proves more attractive than one without them, that even with the addition of animals only, it is more interesting than with nature "unadorned," yet it is a question whether many an otherwise good landscape is not hopelessly spoiled by these adornments, for the excellent reason that in the greater number of cases they are not suitable, not in keeping with their surroundings, inharmonious, in a word—unnatural. Painters realize this power of the human figure to enhance their work or spoil it, and are particularly careful that such additions shall be in harmony and not obtrusive.

I am not wholly persuaded that puppets, lay figures, or persons dressed for the occasion, and duly arranged in the most beautifully mechanical manner, "according to Burnet," ever are in keeping with any surroundings, except the improvised properties and substitute scenery of parlor theatricals. Are "madeup" pictures ever of the highest merit? Do they not always lack the charm of naturalness? We can rarely divest ourselves of the consciousness that, after all, it is only acting, "most excellent fooling", perhaps, but still unreality. They are false in sentiment and a travesty upon truth. A picture of this kind can never so strongly appeal to the feelings as one of some actual occurrence. Granted that the event must possess something which shall, in itself, render the photograph more than the mere record of commonplace facts. But one has not far to seek for these; they are about us on every hand Life is filled with little episodes worthy of perpetuation, incidents that are most appealingly pathetic, quieting and restful in their tranquil repose, joyous or laughable.

What the most perfect theatrical representation is to the real scene it depicts, so is any pictorial delineation, where models are used, to the living verity. Rarely indeed does it do more than approach the truth.

The painter, it may be said, makes frequent use of models. He does, certainly; but, it may be added, always employs for hispurpose a genuine "character" if one can possibly be secured. Then, again, his long and careful training enables him to quickly detect and easily correct any shortcomings in the model to modify, alter and blend all, into a perfect and harmonious composition.

Not so the photographer: he may change nothing. All depends upon his model or his subject, and very cautious must he be, that what he has designed for the pathetic, prove not the ludicrous. If his scene be real, however, it will speak a language of its own—a language which shall seldom require an interpreter.

Some writers there are, who assert that a citizen, in ordinary costume, is entirely out of place in a landscape. I cannot go so far as that. Circumstances may readily be imagined where he would be not only appropriate, but in a far greater degree than his rustic brother. Much depends upon what the artist desires to express. It is safe, however, to advise that neither attempt to masquerade as the other, or the result may prove what Harding calls "unintelligent, identical imitation," a sign post likeness, the nut without the kernel.

It is not claimed that models should never be used, but that where possible, the reality is ever to be preferred; that the results are such as to justify and fully repay, any sacrifice of time or effort in securing it; that if models are employed, it shall be only under circumstances with whose requirements, they are thoroughly familiar, and can in some measure at least, feel themselves to be what they try to represent.

Unless this can be done, there will be an utter failure as regards feeling and expression. Neither man nor woman can express adequately what they do not feel, any more than a painter can paint the unseen: both would fail of recognition.

Let us strive, then, for naturalness, for truth, for living facts, and let those take the Jarley wax works, who with them can be content.

DIRECT PRINTING PLATINUM PAPER.

By Dr. Richard Jacoby, Berlin.

There is, undoubtedly, no handsomer positive process than platinotypy; professionals as well as amateurs, work the process

with particular favor, and have achieved results which must fascinate every connoisseur. The general public, of course, and the mechanically working photographer, cling to silvered albumen paper—and, as really distinguished and qualified taste is more seldom to be met with as one might be led to believe, aside from pecuniary reasons—the platinum process may never become a serious enemy of the albumen process; but it is supplementary to the latter, and gives us an opportunity to produce pictures of actually artistic effect and most delicate tones. We owe our thanks to Mr. Willis for his handsome inventions and his indefatigable efforts to complete the methods, and his name will be known as long as photography remains in existence.

While in England and the United States the Willis process was received with great interest and worked with comprehension platinotypy made slower progress in other countries; but the recent exhibitions have proved that here it is also about to

assume the position it so well deserves.

But we must not forget to mention besides Mr. Willis the name of Captain Pizzighelli, who, by his energetic researches, so well defined the theory of printing with platinum salts, and invented not long ago a new and simple platinum process—publishing the same most disinterestedly—which actually has effected the recent rise in platinum printing. Based upon Pizzighelli's formula, a paper has been prepared for the trade, for which the following general prescription may find application: Take a piece of the paper and lay it on the negative, expose until the picture has acquired the desired depth, wash in very diluted muriatic acid and in water, and then mount the print; compared with Willis' difficult instructions, this is truly the most simple thing we can imagine. The paper met with much favor rapidly, being highly approved, and the publishers of the "ANNUAL" did not delay a moment to introduce this novelty to their numerous customers. Those, of course, who believe that in the direct platinum process the philosopher's stone had been discovered, that it is universal and everything could be accomplished without the least trouble. might be laboring under a serious mistake. Besides great advantages, it has also its weak points, which must be understood to prevent useless loss of time and money. I have been occupied for several years with its manufacture and feel like talking a little to your readers about the good and defective parts of the same and the rational manipulation of the paper.

Not every negative can be used. While on albumen paper, and better still, on aristotype (chloride of silver gelatine) paper. a print can be made from almost any negative, even the weakest and most foggy one, while the direct printing platinum paper will give good results only from negatives of a certain distinct character. The prints from old foggy negatives are abominable. The paper is of an exclusive nature, works well only with good negatives, and if such are used will furnish particularly handsome prints, but otherwise very meanlooking, insignificant ones. To characterize suitable negatives in a few short words, they must be strong and clear, with much detail and with contrast. It is erroneous—as I have heard a good many times—that the negative should be actually hard; from my best platinum negative I have obtained very good albumen prints. The negatives must be full of contrast and detail, because the picture is in the rough surface of the paper and does not rest on the smooth collodion—glue—or albumen film, and because many of the finer details are easily lost on the uneven paper surface. At all events, if prints are to be made on direct printing or other platinum papers, the greatest care and consideration should be taken regarding the exposure, and above all, the development of the plates. It is here that the greatest mistakes are made. Magnificent negatives for platinum prints, can undoubtedly be obtained with pyro, oxalate, and eikonogen, but I for my part prefer a hydroquinone developer. The one recommended by Baltin has proved its excellency for more than a year in my hands.

As it might interest one or the other of your readers, I will describe the Baltin Developer. The formula is:

40 parts Sulphite Soda,

5 " Hydroquinone,

75 " Potassium Carbonate.

900 " Distilled Water.

For traveling purposes, only one-sixth of the water may be applied, but this should be afterwards diluted with five parts of water when required for use. It is a very clean developer, will keep for months without reduction, and—whether old, mixed or new—if applied at the proper temperature and in the correct manner will accomplish almost everything. Magnesium flash light views, I have developed with the greatest facility with fresh

developer and an Anthony's climax film. I obtained excellent results with even old developers. In developing platinum print negatives with this formula, I commence after not too short an exposure, with old and not too warm developer, and modify afterwards according to circumstances by larger or smaller additions of fresh developer.

One of the most excellent properties of the direct printing paper is its great durability. While all other platinum papers have to be preserved absolutely in chloride of calcium tin cases. and become defective, or are easily destroyed if the cases are improperly closed, or the drying arrangement is in a neglected condition (some of the paper offered for sale being even penetrated by the chloride of calcium lye), the new paper may be put into market in plain paper wrappers and will keep for weeks and months in the same. Those who want to guard against any unforeseen possibility of spoiling, may put their direct printing paper also in a protecting tin case with drying arrangement, but it will keep well in the plain paper wrapper if preserved in a "cool and dry" place; in the latter case it is of advantage to place the packages between some books to keep it under a light pressure and prevent the circulation of air between the sheets. Care should only be taken to guard against hothouse temperature. In such a hot, damp and sultry atmosphere a reduction easily takes place, and the handsome pure yellow of the light sensitive film changes to grav. But aside from this, there is no necessity of being afraid; the article works well for weeks and months, and exterior as well as chemical changes in the film will only take place after a long time. A distinctly visible iron picture will still appear in printing, but the reduction to the platinum picture is only very defective. What causes this change, and if the paper cannot eventually be brought back to activity, is an open question still to be answered.

Let us consider now the sensitiveness and printing capacity of our novelty. My opinion is, that the sensitiveness is somewhat behind that of the developing papers, but during Spring, Summer and the early Fall this is so insignificant that, in consideration of its other advantages, the paper may boldly take up the gauntlet against all other platinum papers. During the Winter season the difference is considerable, and to the advantage of the developing papers. The paper can be printed in two different ways: In the first place it can be done on an entirely dry

sheet, when a distinctly visible iron picture is obtained, which, by steaming or breathing on, can at once be transformed into a platinum picture and become, therefore, so to speak, developable; or a paper is applied, to which, before placing it into the printing frame, has been conveyed a small quantity of watersteam.

A platinum picture will form at once if the required quantity of water necessary for the chemical process—the developer, as is apparent from its origin, being in the paper—is already present during exposure. This is, therefore, the proper direct printing paper. It can hardly be realized, but the results, according to the process, are so different that one might be led to believe there were two different kinds of paper. The dry printed sheets furnish brown to yellowish brown, those exposed in a moist condition black to brownish black pictures; the latter show the fine full tone so much admired and giving such an attraction to platinotypes. The dry sheets are considerably more sensitive and give more brilliant prints than the moist ones. This difference, however, strikes the eye during the dark Winter season.

Those who prefer the brown tone, which can also be produced by addition of mercury and other salts to the sensitizing solution, should print dry and develop later on; but those who wish to obtain the proper platinum tone should print moist according to the aforesaid, only in good light. The moist paper works miserably in bad weather, slow and without life and strength; then developing paper may preferably be applied; but fortunately the direct printing paper can be used the greater part of the year, and particularly during the proper printing time. It is an enormous advantage if the picture can be seen forming directly in the printing frame, and its gradual development and completion watched. Any one who has ever manipulated developing paper, knows how falsely the state of the printing process is taxed and how much expensive material is lost thereby. Although the price of direct printing paper is higher than that of the developing paper, the finished picture will be cheaper in consequence of less loss in material and more safety in exposure.

If the handsome black platinum tone is desired, moist prints should be resorted to and in good light. The paper kept in plain wrapper has sometimes absorbed already the required quantity of moisture from the air. If this is not the case, then the paper to

be exposed may be held for a few seconds over some steaming water, with the film side toward the same, but care must be had that it does not become wet. Too long steaming destroys the brilliancy of the picture, and there is even danger for the negative. Now and then it happens that the surface tones of the picture appear torn by light spots. If the paper was moistened, a partial drying in consequence of the dry atmosphere has then taken place, which can be compensated again by supplementary steaming. If the printing was dry, a partial absorption of vapor from the air has taken place during strong atmospheric moisture. Protection against this can be had by a suitable and impenetrable support in the printing frame.

In my pictures of black tones, it can be observed that the deepest shadows have a brownish shade, and turn out somewhat torn. This is a solarization appearance, which can be remedied in the most simple manner by covering the spots in question on the negative with carmine, thus preventing an over exposure.

In each case, whether the printing be dry or moist, boiling water should be at hand for the final developing of the whole picture or some parts of the same. Sometimes it could easily be accomplished by simply breathing on the paper, however, this is physically, very exhausting, and therefore, only practicable for the smallest sizes.

Those who print in brown tones, therefore dry, may become accustomed to judge from the iron picture of the state of the printing process. It has been repeatedly recommended to breathe from time to time at the same corner of the print, and to examine the part so developed; but this is not opportune, because the spot will ordinarily acquire a bluish black tone strongly contrasting with the brown coloration of the rest of the print.

Above all, it must be made a rule, to begin sufficiently early with the printing that the picture can be finished on the same day. Pictures which have been left in the printing frame over night, lose their brilliancy in consequence of the chemical action which continues in the dark, and an exposure lasting longer than a day should be resorted to only, when the negative is extremely dense. The sheet may be steamed in a dark corner of the room and the negative put in, but the print should not be examined too frequently afterwards by opening the printing frame. The purity and softness of the white parts—the principal attraction of platinum prints—will greatly suffer thereby.

It is absolutely necessary to fix the finished prints at once. I have mentioned already that the chemical action of the sensitive film, if once introduced by exposure, will continue in the dark and evenly over the whole surface. We loose, therefore, if prints are kept unfixed. For fixing, several baths should be used; the first one may have been in use already, the latter should be fresh. The concentration of the former should be about one to seventy; that of the latter somewhat stronger, say about one to fifty. The prints are left therein until the whites appear quite pure, but not much longer, the paper fibre being slowly attacked by the muriatic acid. Subsequently, the washing must be done well to remove the acid as much as possible and the print is ready, requiring nothing more, except, perhaps, here and there some India ink or pencil retouching.

For mounting, a grained cardboard of gray to bluish gray color should be selected, and the prints should be pasted on; in relief or intaglio, mounted to represent a helio-engraving or copper engraving the prints will also look very handsome. importance of the background should not be under estimated just on account of the soft tones of the pictures, and the same should be carefully examined before the picture is mounted. The effect depends a great deal on this circumstance.

I believe that in the foregoing, I have touched pretty nearly every point, and it would give me pleasure and satisfaction if this article should help to clear any doubts and contribute to the development of this beautiful and deserving process.

MY PORTABLE DARK ROOM.

By J. F. Johnson, Mystic Camera Club.

The greatest obstacle in my career as an Amateur Photographer, has been the want of a convenient dark room; but having hit upon the following, which answers the purpose of the amateur admirably, and knowing there are many amateurs placed in the same position, I venture to hope that the following description of my portable dark room, will help a great many out of one of the numerous trials of Amateur Photography. further recomendation I will say that it may be made very cheaply. Myplan is as follows; I take a commode, such as comes with a chean painted chamber set, one that has a cover on top, also one drawer and a closet below.

A second-hand one can probably be bought for about \$1.00. On both the right and left edges of the cover, I nail a piece of board, as wide and as long as the width of the cover; on the front of the cover I nail a piece of board as long as the cover, but about twice as wide as the side pieces, so that when the cover is raised upright, the whole forms a box, or hood-like structure, with the open side toward the operator. To the edges of the hood I attach any suitable material that will answer the purpose of keeping it light tight, having it well lapped over in front, which I use as an entrance to the dark room; I also have it long enough so that it will fall six or eight inches on the floor, so as to keep out white light from that direction. I then cut a hole of any desired size in the cover, and put in ruby glass, yellow fabric, or whatever suits my fancy; on the outside of the cover I fasten a lamp bracket, and when the cover is in an upright position I have a first class light to develop by, far better than a lantern, as it is entirely outside your dark room.

On the inside of the cover I arrange small shelves to hold graduates, bottles, etc., when in use, which afterwards are put away in the closet underneath. The interior of the commode, or what is intended to be used for a sink, I arrange for developing, having a pipe run in to the closet beneath, so that any developer, water etc. that may be spilled will go into a pail. For washing negatives I take two pails, with a small faucet in each. Fill one with water, in the empty pail put your negative rack with negatives to be washed, and put the pail that you have filled with water, on a shelf fastened to the front of the commode directly over the empty pail; turn on the faucet, and when the pail is empty, simply change them about and repeat the operation and you will find that you can develop any quantity of negatives, as comfortably as if you had a room ten feet square. What is more, you will find it is much pleasanter than going into a damp cellar or a cold dreary attic, when you have more or less negatives to develop, as with my arrangement you can develop in a kitchen or chamber. You can keep it in one corner of the room, and when you wish to use it, all you have to do, is to roll it out into the middle of the room, lift the cover upright and fasten, light your lamp, put it in the bracket, or on a shelf arranged for the purpose, and then you are ready for one, two or three hours work or pleasure, at developing,

The covering all folds inside the hood so that when you close it, it is very compact.

You will find it light tight, very easy to ventilate, and the cost of the whole thing is merely nominal. I trust that the above description of a portable dark room, will help many an amateur out of what has been a difficulty.

ICELAND.

By Dr. H. Valentine Knaggs, England.

Last year I made some remarks respecting the difficulties and anxieties against which amateurs had frequently to contend when taking views on enclosed premises or in private grounds. I suggested that where scenery was concerned, the operator should consider himself quite justified in stealing or appropriating whatever landscapes he might pitch upon, provided he did not claim any copyright in such productions. It is perfectly obvious, however, that this is a very minor difficulty and is only to be met with in localities where photo tourists and sight-seers congregate in considerable numbers and where they are thought to be "justifiable game." Should the traveling amateur go out of the beaten track, worries and troubles must inevitably bristle on all sides of him. The mere physical nature of the ground traversed, may entail a serious liability to loss or breakage of apparatus or to spoliation of dry plates. Faulty manipulations are answerable for much, but the conditions under which a journey is made, may be equally to blame when the returning "voyajeur" fails to bring home his usual stock of blooming negatives.

Of all the out of the way "dead and alive" places on this earth, commend me to Iceland. There the practice of photography is indeed conducted under the most trying circumstances. Yet it is a singular fact, that two persons out of every three who reach that part of the universe in safety and return to tell the tale, possess a photographic outfit. The tip of a lens or the edges of a few dozen dry plate boxes, are certain to be found sticking up their "noses" as the passengers' traps are being unpacked. So it happened that when I arrived there last June, fondly expecting to be the sole representative of the A. P's. I found people with cameras on every side of me. When I say that a person can set up his apparatus in the capital, without the presence of

an admiring crowd of calculating boys and dear old ladies, it will be understood that the sight of a camera is an everyday occurrence. The natives, in fact, have got used to this infliction, just as the visitor will, for the time being, have to acclimatize himself to dried cod fish plus the aroma.

But I am anticipating, though this is quite one of the real luxuries with which the amateur will be regaled on his arrival. Iceland covers as large an area of territory as that of "old Oireland." It possesses a population of about 70,000 inhabitants, of which 4,000 are located in Reykjavik, the seat of government and capital. The island is very little visited at present, except by tourists of the more adventurous kind, who find in the rough out-of-doors life of the interior, a fitting form of relaxation from the quieter and "hum drum" duties of existence in their own country.

In the vicinity or Reykjavík, a modicum of work will be found for the tripod. The eider ducks are a very interesting study; the farm where they breed is located on an island facing the town. In the month of June it is not difficult to secure a negative of a number of the birds actually sitting, or of a "down" nest filled with eggs. Then there are the hot springs of the Lang, which can be reached by a walk of half an hour's duration. Here the poor people utilize the hot water to do their washing. The effect is strikingly picturesque, though perhaps a trifle weird, when viewed through the steam. Reykjavik itself is a very dreary place indeed. There is absolutly nothing to do but to eat, drink, smoke and stroll about, until the place grows weary to the eye. A few pretty mud and stone cottages may be seen here and there, otherwise the town is mainly composed of a number of houses built of wood and galvanized iron, which give it for all the world the appearance of a bran new American settlement. I may add that there is a professional photographer (Sygfus Eymunsen by name) in the place who is very accommodating and willingly lends his dark room to visitors, but it is as well to note, that though his own prints of Icelandic scenery are very good, he does not stock plates or other photo goods. I can also confidently recommend Andreas Dahl as a guide; he is young and thoroughly enthusiastic, as far as his work is concerned.

It is generally with a sigh of relief, that preparations for an expedition up the country are made, but it is then, of course, that the amateur is placed on his "metal." All traveling in Iceland

is done by riding. With the exception of a few road making carts, there is not a single vehicle in the island; it is utterly impossible to walk any distance inland on account of the streams and bogs, while the roads are of the roughest description, in parts consisting of mere bridle paths across lava fields, etc. All necessary baggage in the way of clothing, top boots, food, camera, etc., all of which (especially the tinned and other provisions), will have to be brought from England, are to be taken with the party. Once away from the capital, it is practically impossible to purchase anything except farm produce, black bread and coffee.

The entire outfit is carefully stowed away in pack boxes and so carried by ponies. Woe betide the unwary amateur who is careless in this respect. I was told of a Belgian gentleman, who carried a whole plate kit with him, but he had not been out forty-eight hours when the entire lot of plates which had simply been loosely deposited in one of the pack boxes, came to grief and got smashed. The photo apparatus must therefore be most carefully put away, with plenty of hay or other padding and each packet of plates ought further to be wrapped in some waterproof material, such as the thin gutta percha tissue used as a surgical dressing. It is very inexpensive and most useful to prevent damage from rain or moisture.

The habits of the peculiar "genus" of pony which is supposed to be responsible for our valuable property, are simply wondrous. The animal generally goes along at a kind of jog trot, which will shake out any loose screws in a camera and either completely smash up loosely packed glass plates, or scratch the films to such an extent as to render them quite unfit for use.

I may mention incidently that a quantity of entire Osborne biscuits were literally converted into flour in the space of about three days, because they were placed loosely in a tin. This may serve to illustrate the enormous amount of vibration to which our packs are subjected or to demonstrate the probable fate of the dry plates, if improperly or carelessly put away. When not engaged in trotting along, the demon pack pony, is usually to be found making his way over huge volcanic boulders which abound on the route, in search of grass. Occasionally, to create a diversion, he tries to free himself of his encumbrances and may succeed in smashing the somewhat flimsy boxes and scattering their contents. On fording a stream he is not averse to rolling over in the

water, so that he may indirectly have his revenge on his temporary owners.

Whenever a photo of some wayside scenery is wanted, the process of getting the apparatus into order takes from one half to one hour. Firstly the particular photo pack pony has to be caught, then the camera, etc., taken out, and when the view is taken, repacked with the usual amount of care. Unless, therefore, a small "detective" is carried, slung over the shoulder or strapped to the back of the saddle, it is impracticable to take many views until the object of the day's journey has been attained and a halt of twelve or twenty-four hours called for. Films are, I ought to add, most useful from their lightness and non liability to breakage or damage, but I am still strongly convinced that plates yield the best all round results. The former, owing to a certain amount of grain are not adapted to make good sharp lantern plates, such as we can obtain from a dry plate. I must confess to a partiality for the "Ilford ordinary" which have a thin film and so give atmosphere and a more correct rendering of distance.

One great advantage of Icelandic traveling, is that you can photograph at all times, seeing that there is practically no night. Some of my best efforts were obtained at or after midnight. This leads me to speak about the matter of changing plates. It must be confessed that at first sight the absence of darkness would appear to be an insuperable obstacle, especially when camping out, far away from any visible habitation. Yet with a small pocket ruby lamp, an improvised dark compartment can be readily put together. To do this adjust a few pack boxes in the form of a triangle and throw over them and yourself a number of rugs and wraps until the space available for changing purposes is perfectly dark. Then the lamp can be lighted and the changing proceeded with. If a prolonged stay were made in one locality, a sheep house would do duty for the purpose, though they will seldom be found light tight unless made so.

Then as to scenery. What is deficient in one respect, is superabundant in others. That is to say, excepting meadow land, a profusion of wild flowers and an occasional "dash" of brush undergrowth, which is playfully known as the dwarf birch, there is practically no vegetation such as we in England or America are accustomed to see. One long endless array of lava fields, extinct volcanoes, interspersed, here and there, with farms and grassy plains, while hot geysers, seething sulphur springs,

enormous glaciers and mountains, are thrown in occasionally by way of variety. Then you have Icelandic scenery in a nutshell.

It is difficult to give local coloring to our productions, seeing that you may ride for days without meeting a soul. When you do get the coloring it is not an harmonious blend or your apparatus (the detective always excepted) is not ready for it. On the other hand the cloud effects are literally wonderful. I do not remember ever having previously seen such superb skies, but then foregrounds do not invariably lend themselves to this aerial grandeur.

The geysers are most unsatisfactory things. The large geyser which is asserted to be the biggest in the world, often soars to an altitude of 200 feet. For some unaccountable reason it is most bashful of strangers and strongly dislikes being photographed. In fact I have neither seen the "animal" go off nor have I ever seen a photo of it in eruption. Our party did not even see the smaller on The Strokkhr, as it is named, erupt, although we expended ten shillings in turf, to try to induce it to do so in order to get a negative. The farmer, who runs this property, charges five shillings each time that about half a dozen sods of turf are inserted into the geyser basin. On the failure of each dose of this "emetic" he buoys up your hopes to have yet another try and so draws you on in the little gamble, like the Monte Carlo croupier with his rouge et noir.

Too much cannot be said in praise of dear old Heckla. It is one of the loveliest and most fascinating mountains I have ever seen. Of course, we all (that is two of us did) went to the top of it and a stiff climb it was, too. Five hours climbing, up a steep wall of sharp edged volcanic clinkers, plus a camera, is no light undertaking in these degenerate days. Our boots were almost minus their soles when we had descended. I treasure up those photos taken from the summit, more than many other of my negatives, particularly as we had a superb view. For two years prior to our arrival at the farm from which the ascent was made, no one had succeeded in reaching the top.

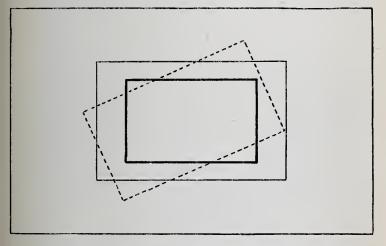
I don't think I ever enjoyed a holiday so much before. My camera, a one-fourth plate one, did not quite relish the journey so much and arrived home considerably the worse for wear and minus several screws and bolts. The traveling up country, is a free and easy, go as you please, perpetual out of door kind of existence. Very novel, indeed, it ought to prove to men who for

the greater part of the year are accustomed to the life and ways of great cities. Perhaps one of the most interesting features of the journey, to me at least, was to witness how a staunch teetotaler could put away whiskey in those parts and yet no one be any the wiser for it. To suit the susceptibilities of some of our American friends the potion might very well have been labelled the very latest developer for dry—well, yes—plates.

LANTERN SLIDES.

By Frank La Manna, President Brooklyn Academy of Photography.

In making lantern slides by contact printing, difficulty is often experienced in properly centering the negative or ensuring accuracy in vertical and horizontal lines. A simple manner of so doing may help some fellow amateur.



It is well to have a deep printing frame somewhat larger than the one-quarter plate, say a 4x5, or a $4\frac{1}{4}x6\frac{1}{2}$.

Cut a piece of $\frac{1}{2}$ inch wood so that it fits snugly and without play in the printing frame; in the exact centre of this piece make an aperture a trifle larger than the ordinary lantern mat, $3x3\frac{1}{2}$ inches will suffice; this aperture should have its sides and ends

perfectly parallel to the edges of the piece itself; paste upon it a piece of felting or like material, of course without covering the aperture. The negative placed on this board can be shifted about until the best position for the slide is found; the felting gives just enough friction to keep the negative from slipping.

Cut another piece of $\frac{1}{16}$ holly or even of cardboard, also to fit snugly in the frame, and from the centre of this cut an aperture $3\frac{1}{4}x4$, or just large enough to admit the lantern slide plate; dropping this over the negative. The exact position of the lantern plate cannot be mistaken; close the back, expose and develop.

Another advantage of this system is, that quite a portion of the plate has not been exposed to the light, and its appearance during development is a guide and point of comparison with the high lights of the picture.

In the diagram, the heavy lines show the cut in lower board, the dotted ones a negative with the horizon very much askew, and the light lines the upper board or plate guide aperture.

THE PARSON AND HIS CAMERA.

By the Rev. Geo. W. Lincoln, Columbus Camera Club.

A parson without a hobby is a man greatly to be pitied, for he is missing much of the enjoyment of life, and unconsciously falling into a rut. Unless he has some pursuit outside of his vocation, some hobby which he can ride, he will be very apt to fall out of sympathy with his fellow men, and view all recreations, as so many attempts of his satanic majesty to entrap the unwary. They will be denounced as sinful wastes of time, if nothing worse; and the luckless wight who happens in his innocence to be an enthnsiastic devotee of some sport or recreation, must expect nothing but frowns and stern words of condemnation.

It was the realization of this clerical weakness, which has led me to ride my hobby into the "Annual," and to plead with my brethren to become photographers. They do not know what they have missed in not having a camera. They are out of touch with the age, for the photographic parson is the creature of the dry plate era. In the past, there have been the fox hunting parson, an estimable gentleman who never halted at a five barred gate; the fishing parson, and the athletic parson, the latter a man known for his skill in baseball, cricket or tennis. But the photographic



Negative by Dana.

Bartholomew & Peckham.



graphic parson, the reverend gentleman, who stains his fingers with pyro, and bores his friends to pose for him, is a new species. He owes his existence to the discovery of the dry plate, that fascinating article so dangerous to the pocket book, as well as the peace of the mind.

Like all photographers of the amateur order, your photographic parson is a good fellow, who does not mind a five mile tramp with his box, and whose greatest enjoyment on a hot Summer night is to swelter in a dark room, trying to coax the refractory image out of an undertimed plate. He is au fait in all the mysterious secrets of the dark room; he is versed in lenses and can discourse learnedly of the relative merits of the different kinds. He has known the mortification of trying to develop a plate which he finds he has never exposed. He has had his choicest efforts disappear in a mass of fog. He has had his patience sorely tried by frills, blisters and stains. Above all, he has received many a lecture from his much enduring wife, for the awful muss which he has made, and the general demoralization of the household which he produced.

But with all this, there is no better fellow going than your photographic parson. His hobby seems to benefit both mind and body. He is never sad or morose. His contact with mother earth in the effort to find "something to take," develops his muscles and fills his lungs-with fresh pure air. His efforts to save an undertimed plate teach him the virtue of patience, and assure him that there is nothing to be gained by haste. Above all, is the glorious consciousness that his time has not been wasted, that is, provided his efforts have been successful. For his pictures will always be a source of pleasure to his friends, who will not be at all bashful about asking for prints.

Seriously, however, a parson can make his photography an aid to him in his work. Often there are occasions where he would like a picture of his church as a souvenir. To employ a professional photographer would entail too much expense, so that the only picture which remains is that stamped upon the mind. If your parson is a photographic crank, his camera will soon be called into play, and the treasury of some needy society will be replenished by the sale of his handiwork. On a recent occasion, Bishop Gilbert, with a party, made an extended visitation of the Indians in their reservation in Minnesota. As they are very shortly to be abolished, and the Indians transferred to other lands, it was the

last time, when it would be possible to see Indian life under such conditions. In the Bishop's party was a photographic parson, and his camera caught many views which will be of permanent interest. In my own very limited experience I have found a case when my photography was a source of real enjoyment. Some improvements which were much needed in the church were made by a lady, who at the time was quite sick. She had always hoped that she would be able to go and see the result of her generosity. But her sickness was her last, and the only idea which she ever had of the changes which had been made, was from one of my pictures. I shall never forget her pleasure when I handed her the prints, and I felt that after all, my photography had done some good.

If your parson is the possessor of a hand, or as it is more improperly called, a detective camera, he is fortunate. It will be his inseparable companion in his rounds. Many a road and street scene, many a pretty bit of landscape will be caught, and the long walks which he is forced to take, will lose much of their loneliness. There is now lying before me, a picture of a teamster giving his horses a drink from a trough by the road side, which was caught in this way, one afternoon when I was on my way to see a sick person in the country.

When your parson grows weary in the Winter from the incessant strain of his work, he can resort to making bromides, and will find there an unfailing source of recreation. Since a bromide can be made with eikonogen, the process is much simpler, and there is no danger of staining the hands and the clothes, as when oxalate was used. The choice negatives will again renew the pleasant experiences of the Summer, and recall the happy times in which they were made.

Finally, if your parson is very ambitious in the photographic line, let him try his hand on making lantern slides, either by contact or by reduction. He will find it most fascinating work. For every parson, whom I have known, has an illustrated lecture in view. He would not be a nineteenth century parson if such was not the case. If he can make his own slides, he is so much better off, and the preparation of the lecture will be solid fun.

The only real objection to the parson's photography, is its expense. It will eventually find its way into your pocket, says every amateur. But after all, there is no recreation which will furnish so much permanent enjoyment for so little expense as

photography. Every year sees a reduction in the cost of outfits and materials. A man with a fairly good camera and a single landscape lens such as are found on the Waterbury or Rochester or Anthony boxes, can make really artistic pictures, if he has the taste and will take the necessary pains. Any reference to the price list of photographic goods will show how moderate are the prices of hand cameras. The Hawkeye, the Waterbury, the Climax, the P. D. Q., are all striving for the popular favor, and are comparatively inexpensive. In photography, as in everything else, each must be his own judge and decide how much he can afford. But there has never been any recreation devised, which begins to compare with it for combining pleasure with profit. It starts new trains of thought in the mind. It opens a field for scientific study. It changes, for a time, the whole current of thought. It takes the parson out of doors, and leads him to appreciate the beauty of nature. It develops his artistic taste. It is an infallible cure for the blues. My advice to any parson, is "Get a camera." And if any reader of the Annual should wish to make his rector a present, "Get him a camera."

TREATMENT OF OVER-EXPOSED PLATES WITH PYRO.

By Edward Manser, Peekskill, N. Y.

The following method of treating an overtimed plate, may be found useful by those members of the craft who still stick to that

old and faithful friend of photographers-pyro.

In developing, I use the pyro and soda mixture at normal strength, and when the detail is slightly visible, throw off the solution, rinse the plate, and pour on old developer [of which I always keep on hand a bottle or two], to which has been added a few drops of fresh pyro. In most cases the intensification will be rapid, and care must be taken not to carry the development too far or a very dense negative will be the result. If the first installment of pyro does not act, add more. A little experience will soon teach the proper amount which will vary with the brand of plates or the age of the developer; do not let this last become too aged and infirm.

If, in the first development, the plate comes up too rapidly, do not allow the new developer to act too much, or the process of intensification will be long and tedious; this fact should be borne

in mind. If, by any chance, the negative is too intense after fixing, it can be reduced by any of the usual means and will still retain its vigor and brightness.

I have good negatives handled in this way, which otherwise would have been worthless; they now make strong, bright, crisp prints with good contrast.

COLORING LANTERN SLIDES.

By Clarence S. McKune, New York Society of Amateur Photographers.

The coloring of lantern slides, is one branch of photography the average amateur has held aloof from, whether it is, that he considers the making of a good lantern slide in itself a sufficiently difficult subject, or that, having made a good slide, the risk of spoiling it does not justify the ultimate results, I cannot say; yet to me there is no prettier picture than a well colored slide; it is not only a gratification to himself, but a source of pleasure to his friends.

While a lantern slide is a beautiful thing when thrown upon the screen, the exhibition of seventy-five or more in an evening, all having about the same tone, soon grows monotonous, and by the time the exhibition is over, we in our hearts are glad of it, while, on the contrary, had they been interspersed with a few colored ones, how much more pleasing would the exhibition have been.

There is unquestionably a great deal of patience required and some skill, or more properly, taste, as without any idea of the harmony of colors, our amateur friend had best let well enough alone and confine himself to the making of the slide; still, with but few exceptions, we have these qualifications, and I see no reason why one should be deterred from at least making the attempt. But little apparatus, outside of those in every day use by the photographer, is required, three or four good camel's hair brushes, with hairs from one-quarter of an inch in length to an inch. These should, when wet, come to an even fine point, and should always be kept clean; an ordinary retouching easel, a small soft sponge, a piece of opal glass about six inches square, and a box of what are known as Egyptian dyes, each box holding from twelve to twenty small bottles of various colors. The

entire cost is but trifling, and with the above articles I have mentioned, the novice can commence work and the results obtained will prove more than gratifying; another kind of aniline dyes from which excellent results can be obtained and which almost all drug stores keep in stock are the Diamond dyes. These are mixed in boiling water and, while a little cheaper than the other, do not produce as good results.

Should you be afraid of spoiling your slide by putting on the wrong color, I would recommend, till one becomes accustomed to the work, to boil a little gelatine (hard) in water and flow over the back of the plate, the same as you would in varnishing a negative. On this, one can put his colors without any fear of the slide being spoilt; should the wrong color have been put on, all that is necessary, is to scrape off your gelatine, flow on some fresh gelatine, let it set and commence over again.

The film upon which you are working should be kept wet, not sufficient to let the colors run nor so dry or tacky that they will not flow freely; there is a medium between the two that one soon obtains after a little practice.

Having everything now ready to commence, you first give your attention to the sky, then, if it be a marine subject, the water, and lastly, whatever remaining objects there may be, for instance, a ship, rocks, etc., or, if it be a landscape, first, as before, try the sky, then the trees or grass, and finally, the living objects, if there be any.

It is claimed by many, and those who have had more experience than I, that aniline colors do not hold their hues, that they fade after continued exposure to the light, etc. Even acknowledging such to be the case, the deterioration is so slight, I think it should deserve but slight consideration. I have slides that were colored two years ago and to-day they look as well as when first made; a coating of collodion flowed over the film, as one would in the varnishing of a negative, materially brightens the high lights, though this is not a necessity.

The use of oil and water colors are recommended by many, yet my experience leads me to believe that with the aniline dyes, equally good results are obtained with less trouble.

SOME SUGGESTIONS AS TO THE PROPER SUBJECTS FOR LANTERN SLIDES, AND SOME FAULTS IN SLIDE MAKING.

By A. S. Murray, Baltimore, Md.

From some years' experience with the public exhibitions of slides shown by amateurs, and those usually contributed by members of our different societies, I have gathered the following named facts, which I think will be useful to many workmen in this, the most fascinating of positive printing; and if acted on, our exhibitions will prove not only interesting to ourselves from a technical standpoint, but more entertaining to our non-photographic friends than they now sometimes are.

graphic friends than they now sometimes are.

I have often found that we have too many of the beautiful

streams with wooded banks, with deep shadows and faithful reflections, altogether too much alike to be distinctive or attractive to the friends we wish to entertain by the showing of them. So many of these are thought much of by the exhibitor only, as mementoes of a pleasant walk or an enjoyed holiday, having valued associations on account of the pleasure or trouble experienced in the getting of them. Other pictures we find many times repeated in the collections of work done by almost any amateur, are those of a well shaded roadway, or a mill dam, with the line of the bank running directly across the centre of the composition, with water clear into the foreground, trees in background and distance with a beautiful reflection of the mill and foliage. These pictures of reflection are, in my humble opinion, a "delusion and a snare" from an artistic standpoint. Distant mountains or scenery together, with all covering a wide range of landscape, are nearly always "flat, stale and unprofitable." Being present at an exhibition, a few evenings since, of the society "lantern night," to which I have the honor to belong, there were shown the slides of one of the clubs belonging to the American lantern slide interchange, a very great many of the class of subjects spoken of, together with a lot of such matter as foreign buildings and views in gardens and parks; but none of these excited the applause which was bestowed upon a group of horses, a barnyard scene, a group of children, a couple of old people enjoying their lunch at a country fair. In selecting subjects for your lantern work, with which you desire to amuse your friends in a public exhibition, it is always best, in

my judgment, to have those pictures which at a glance will tell the story and put your spectators in the same position and condition of feeling you were in when you conceived the idea which prompted you to take it. These we call "special composition," or figure work; those are the ones in which figures of people or animals are introduced as the special part of the picture, and if not so, at least have it largely dependent on them; this will give life and snap to your landscape. Groups or single figure work of animals, flowers and statuary are always appreciated, and with statuary many pleasing effects with color screens in the lantern, may be used with discretion and with pleasing results.

To be sure, the writer may be one of those who personally enjoys this class of work more than he does the landscape; but I would like the reader to notice that at all exhibitions where the "uninitiated" are to enjoy the evening with the strictly landscape fancier, those of the class above named will receive the

most general applause.

So often we will hear the remark made by those of our friends who do not understand some of our faults as photographers, that this or that picture was taken in the Winter, and truly they do appear so, from a want of proper attention to detail in the high lights and a desire to maintain the "clear glass effect" in the sky of your picture. First make up your mind whether the sky should be the clearest part, and if so, then expose and develope to suit; if not, then act accordingly.

Hoping that this effort of mine will be appreciated, and that it will be the cause of bringing more of the special composition picture to our lantern slide contributions to the interchanges, I would like to state that this is only the result of active experience in work of this kind in different localities of our broad

continent.

A NOVEL AND PLEASING METHOD OF MOUNTING PHOTOGRAPHIC PRINTS.

By C. R. Pancoast, President, Waterbury Camera Club.

Many a fine photograph is spoiled by want of taste displayed in mounting. The artist, studies the effect of the frame for his painting, quite as much as he does the work itself, striving to heighten the effect by a judicious selection of a frame. The mount is to the photograph, what the frame is to the painting,

and while elaborate mounts often detract from the beauty of the work they seek to enhance, yet, on the other hand, extreme simplicity often produces less pleasing results. The primary use of the mount is to give the photograph a rigid support and, secondarily, to give it an artistic finish. Without attempting to discuss the various styles of mounting on cardboard, which, to say the least, are more or less hackneyed, I will describe a method which, though not new, is, in my opinion, one that offers great scope for the display of artistic ability, as well as giving a means of adding very greatly to the effect of the finished print without in any way detracting from its beauty. The means necessary for this work are so few and so readily attainable, as to offer no obstacles in the way of those dreading an expensive outfit. The first step is to procure a quantity of rough drawing paper, preferably of light weight, and a few sheets of a thin paper of the color and texture suitable for an "India tint." Now take a piece of any ordinary medium weight cardboard of the size of the desired mount and paste carefully upon it, a piece of the rough drawing paper, using what is known as "bookbinder's paste." Before this is thoroughly dry, cut a piece of the India tint paper of a size suitable for the print. I might say here that all cutting of the paper is best done by a sharp knife on a glass plate, using a steel straight edge as a guide. In this, of course, the taste of the mounter comes in play. I would suggest as a guide that for a 61/2x81/2 print, a margin of one inch all round should be left, when cutting the India tint paper, to suit the picture, or perhaps one inch at the top and sides and 11/4 inches at the bottom. This form of tint is often seen on engravings and etchings. After pasting this in the centre of the mount, it should be put under pressure until thoroughly dry, when it will be found to be sufficiently flat for all practical purposes. Now, if a "plate mark" is wanted, and it certainly adds very greatly to the general effect, an imitation can be readily produced by the following plan: Take a piece of thin cardboard of the exact size of the mount and cut out of the centre a piece the correct size for the intended plate mark. This must be done with a sharp knife and carefully, so as to preserve both the inside and outside pieces. Next, the centre piece must be trimmed, so as to be at least oneeighth inch less in size than the opening from which it originally came, then carefully bevel the edges with a piece of sand paper secured to a block of wood and round the corners slightly.

These pieces now form the "punch" and "die" for the plate mark. By laying the mount on the outside frame of cardboard or the "die" and then placing the beveled "punch" on top, using great care in order to preserve an equal margin all round the India tint, the whole is ready for pressure either from an office copy press, or, preferably, a rolling press. Upon removal of the pressure it will be found that the beveled card has forced the mount into the opening in the die, producing an effective and neat plate work. It is advisable not to use too heavy a card for the die and to re-inforce the punch, with one or more thicknesses of cardboard. A good plan is to use one of the heavy beveled edge mounts, to be obtained at all the photographic supply houses for a punch and then make the die to correspond. After plate marking, the mount is ready for the picture, which can then be mounted in its proper position. To those who like to experiment in novel effects, the method just described offers many advantages, and the results are certainly pleasing and give a pleasant relief from the stereotyped methods now so common. Where bookbinders' paste is not readily procurable, a very good substitute may be made as follows: Two ounces of wheat flour are mixed in a quantity of cold water to the consistency of thin cream. Add to this one ounce of ordinary laundry starch which has been previously dissolved in a small quantity of cold water. The mixed flour and starch is then boiled until it has reached the proper consistency for use. should not, however, be used until cold.

RECENT PROGRESS IN PHOTOGRAPHIC SURVEYING. By Lieut. H. A. Reed, 2d U. S. Artillery.

In regard to the application of photography to scientific pursuits, it must be interesting to lovers of the art, to note the considerable progess made in the last few years in photo surveying.

Much attention and practice are noted in the United States and foreign countries.

In England, at Chatham, in the practice of balloon photography, experiments are being continued by which a map of the country immediately beneath, covering areas varying from one-fourth to several miles in diameter, is obtained. The photographic societies are taking steps to include photo surveys of

their neighborhoods in their regular work; and in the colonial surveys this application is much more extensive, bearing, indeed, a very important part. The recent excellent work of E. Deville. Surveyor General of Canada, gives decisive evidence of its value. He states that in the Dominion surveys, which were recently extended to the Rocky Mountains, the ordinary methods of surveying were found to be inadequate; they sufficed for the tolerably level tracks, but for the hilly and mountainous regions they were "too slow and expensive," and photography was resorted to, with results which were all that could be desired. The camera here used was a carefully made mahogany, brass bound, rectangular box, suited to the English half plate of 4¾ x 6½ inches; and, in use, was placed on a tripod furnished with leveling screws, and leveled by means of two ordinary tube levels attached at right angles to each other, and which could be placed on that face of the camera which happened to be uppermost. The means for determining the horizon and principal lines were the images of four fine combs, one midway on each side, attached to the camera immediately in front of the plate—the use of small stops making these images clear. The lens used was a Dallmeyer wide angle, No. 1, A, of 53/4 inches focus, affording a horizontal angle of 60° when the plate was disposed with its longer edge horizontal. Six double plate holders were employed. But one adjustment of this camera is required, viz.: to ensure the verticality of the plate when the tube levels indicate that the camera is level. The best way to effect this is to substitute for the plate, a good plane mirror, face to the rear; then set up a transit in the vicinity; the axis of the telescope being horizontal, observe a distant point intersected by the cross wires, also its image in the mirror; if the latter is also intersected the mirror is vertical; if not, then the tube levels need adjustment. This box camera being rigid, and the focus therefore "permanent" and suited to distant views, and the lines on the faces indicating the field of view, no ground glass or cloth is needed. Care is taken to make the plate holders exactly alike, a condition which, so far as distance from lens to plate is concerned, is ascertained by measurement.

Of the dry plates now obtainable, the orthochromatic gelatine bromide are probably the best for surveying purposes, because of the clear definition of distant objects which they afford; and they need not be of the rapid brand. So soon as films which shall give as clear definition and produce as little distortion as glass, are produced, will this application of photography receive a rare impetus.

The use of heavy bromide paper for prints is recommended because, as compared with ordinary albumen paper, contraction in drying is more uniform, and there is therefore less liability to distortion.

With many others eminent in the profession, Gen'l Deville believes that the precision of a photographic survey, when made by most improved methods, is the same as that of a plan plotted with a very good protractor, or made with the plane table; and that, as compared with ordinary sketching the results are, of course, infinitely more precise.

In Italy, the Geographical Military Institute has applied photography very extensively in the field work of topography. The instrument there used is a tripod camera with leveling screws, levels, attached horizontal and vertical limbs and telescopes—in fact camera and transit combined, by means of which all the operations in the field are performed.

The camera proper is a square pyramid with the lens at the apex, very carefully constructed and rigid.

In France, Dr. Gustave le Bon devotes a good deal of attention to showing what a great amount of information, as to location and dimensions of contained objects, can be obtained from a single photograph by the application of the principles of perspective; e. g., to determine the height and breadth and any other dimension of artificial constructions; the plan of an interior or of any other horizontal enclosure; from the entrance of a street, to determine its length, the heights and breadths of its buildings, etc., all simple applications of the rules of descriptive geometry.

He also gives a method of obtaining from a single photograph and one compass observation taken from the camera station, all the survey details, provided any one contained distance is known.

What appears to be a very useful photo surveying instrument, is P. Moëssard's perfected cylindrographe, by means of which nearly a semi tour of the horizon is taken at a single exposure. It possesses the advantage for surveying purposes of confining distortion to its narrowest limits; of, in fact, practically destroying it; and of lightness of outfit, because paper is employed

instead of glass for the negatives. Of course, much depends upon the quality of the paper negative, but the Balagny Thiebaut and other standard "pellicules" are said to give good results. Any size of camera, from four to forty-eight inches radius, is obtainable from the makers. It is recommended by its inventor for its lightness, small volume, solidity, simplicity of construction, facility of manipulation and for the artistic value of the views produced. The writer has inspected this camera at the manufacturers', in Paris, and can vouch for it as possessing the qualities here attributed to it.

A letter of August last from Hawaii states that photo surveying enters largely into the present mapping of the Sandwich Islands. In our own country it is recognized as a valuable adjunct to ordinary methods, and considerable progress is being made in its application. One of the recent neat inventions is that by Prof. Hitchcock of the Thayer School of Civil Engineering. In the use of the ordinary camera, instead of having the pointers, which mark the horizon on the sensitive plate, fastened to the plate holder, they are attached to vertical rods contained in the side pieces of the camera back, so that, having milled heads at their upper extremities, the rods, when the slide is withdrawn, are revolved sufficiently to bring the points into contact with the plate, thus ensuring clear images of the points. A simple adjustment, in connection with the camera levels, makes the lines joining the points horizontal.

From the foregoing, it is seen that photographic surveying enters to a considerable extent into the survey work of five countries; that there is a lively interest in its development, and it needs but a slight consideration of its merits to be speak for it a valuable place if not a brilliant future in this most useful scientific pursuit.

PRACTICAL NOTES.

By Professor Coleman Sellers, E. D.

A NEW USE FOR A PAPER PRESERVATIVE BOX.

The amateur photographer who has the means to purchase desirable pieces of apparatus for his work, soon finds himself encumbered with much seeming wealth, no single treasure but what has its attractive feature. As new devices are contrived, some

pieces are laid aside until the condition is reached sooner or later, of want of room. If an attempt be made to dispose of those things no longer needed, the owner finds that he can get rid of the rejected apparatus only by giving it to those who are less able to buy than he has been. Unfortunately, second hand photographer's traps do not represent any fixed mercantile value.

What to do with this or that roomtaking object, no longer of much use, becomes a problem to those who do not like to throw

them away.

What is useful to the professional photographer is sometimes too much of a good thing to the amateur. As an instance, the large tin can of more than a bushel capacity—used to keep silvered paper fresh—is an elephant with a few packages of Anthony's ready silvered paper resting in insignificance on the wire screen at the bottom.

The unhappy possessor of one of these monsters, recommends it as admirable for keeping dry, cakes, biscuits, candies or any sort of provision liable to become soft from exposure to the air.

I have seen such things come out of the preserving can in good condition after many weeks, and a box of candy that had already become quite soft and sticky, was soon restored to its pristine brittleness.

Why do not the dealers in photographers' apparatus prepare rectangular boxes for this purpose. I have long used a tin "deed box"—say 10x12 and six inches deep; in the bottom is either a box of quick lime or an iron dish with some anhydrous chlorate of potash; above this is a screen of wire netting folded down into a box form to present supports around its edge. This is used for silvered albumenized paper or the platine paper and is very handy—seems quite tight without any cloth on the joint of the lid and box.

SCALES FOR WEIGHING CHEMICALS.

When in Scotland in 1886 an amateur photographer was using a postal spring balance with hanging pan, for weighing his chemicals, in preference to the ordinary beam scale with pans and separate weights. In most matters where accuracy is not essential it is a convenient sort of weighing device. Its accuracy in the United States will depend upon where the spring balance has been made. To explain this I will call attention to the Postal Laws, which define for postal purposes, fifteen grammes as equal to half an ounce,

Recently to test the postal scales I made up a dummy letter addressed to France and loaded it until it was fifteen grammes, certainly 12½ grains over half an ounce avoirdupois. This, presented at the post office, was called one-half ounce or one stamp, even after attention had been called to its overweight.

The knowledge of the fact that the post office will take matter for one stamp, that is twelve grains heavier than the one-half ounce avoirdupois, shows that it is not well to weigh letters on an ordinary scale, or to weigh chemicals on the postal scale, without testing the accuracy of the latter, or without running the risk of extra postage stamps on foreign letters in some cases.

PEN AND INK DRAWING.

Those who take delight in pen and ink sketches, will find that Bromide prints very faintly developed, make an excellent base for pen work, the cross hatched background throws the figures into bold and distinct relief and the faintly indicated shadows can be worked into such condition and expression as is most pleasing, the result being in skillful hands, a good pen and ink drawing with no indication of its photographic base.

A lady in Chicago, one of the enthusiastic amateurs of that city, has introduced some very decided improvements in platina printing and now has selected india proof paper as the surface, with some surpassingly charming results.

A copy of an etching reduced in size, as would be expected gives the impression of an india proof directly from the plate executed by a master hand.

Her platina prints on india paper, of views taken from nature are particularly pleasing and suggest a wide field of search for improvements in artistic effect. She tried many kinds of paper before hitting on one that gave good results, presumably from chemicals in the paper.

Perhaps this hint at what an amateur is doing in Chicago, may induce her to tell the story of her work in her own way and another item will then be added to the credit of woman in the account book of knowledge and discovery.

EARLY ISOCHROMATIC PHOTOGRAPHY.

By Thomas W. Smillie, Smithsonian Institution, Washington, D. C.

In 1868, in a talk with an itinerant photographer (whom I found rather interesting), I mentioned that I was about to order one of the Steinheil lenses, which about that time were being introduced into this country.

Thereupon he remarked, very emphatically, "That is all right for you, but I do nothing but portrait work, and I don't want any new lens for portraits.

I said, "Why do you not want a new lens for portrait work?"

In reply, he said, "Because they don't do as good work as old lenses. You just photograph a girl with freckles with your new lens and you will get a picture that will look like a dominic chicken. Now, with my old lens (I call it my freckle lens) I can make a photograph of a girl with the worst case of freckles and red hair, and she will appear quite passable. I tell you, a lens has got to get mellow before it will do first class work."

On further inquiry I learned that the "freckle lens" had been in his possession about four years; that the man from whom he purchased it did not appreciate it, had used it in the solar camera and otherwise abused it, and, finally, that he, himself, had discovered its value only after it had been in service eight months or more. The lens in question was a C. C. Harrison lens, $6\frac{1}{2} \times 8\frac{1}{2}$, having then been in use eleven years. This photographer also had a Harrison one-half size lens, which was much older than the "freckle lens," but which did not possess its peculiar qualities.

I promised to call upon the owner and examine his lens and its work, but, beside being very busy at the time, I did not attach much importance to the matter, so did not go to see him for several months, when I found that he had left the city. Some three years later Mr. Isaac Rehn called upon me at the Smithsonian Institution, and during a conversation about odd things in photography I told him of the old "freckle lens." Mr. Rehn said that he had heard of such lenses, and, although he had always regarded the "mellowness" as a mere fancy of the owner of the lens, still he thought the matter might be worth investigating. I made some further inquiry, but learned nothing more in this direction until I met Mr. M. A. Root about 1880.

Discussing the subject, Mr. Root said he had known a photographer who claimed to possess a lens of this kind, and having himself seen a good deal of this gentleman's work, Mr. Root was satisfied that there was some foundation for this claim, as at that time the retouching of negatives was quite unknown. Mr. Root further remarked that this man maintained, that a lens was not "ripe" until the brass mounting became all tarnished under the skylight.

I heard of no other such lenses, and as I was unable to find a lens which had the reputation of being either "ripe" or "mellow," the old lenses which I tried possessing no such characteristic, I was constrained to drop the matter again. This I did rather reluctantly, as, about this time, rumors of color screens reached me, and I at once inferred that there must be some connection between these and the "ripe" lenses, more especially as I remembered that, about 1871, I was present when a gentleman (Mr. Gaffield, I think) exhibited to Professor Henry, of the Smithsonian Institution, a series of sun prints in glass, varying in color from light yellow and pink, to red, purple and brown.

Before Mr. Gaffield made his experiments, it was supposed that only glass containing manganese was sensitive to light, but Mr. Gatfield proved that nearly every kind of glass changed color by prolonged exposure to the solar rays.

Now, it will be readily understood by the photographer of the present day, that a reddish tint in the lens, even though so slight as to be almost imperceptible to the eye, would still produce a very decided effect upon an ordinary sensitive plate. Three years ago I purchased from Mr. M. B. Brady, a large Harrison lens, as an historical specimen for the section of photography in the United States National Museum. This lens, Mr. Brady bought in 1846 and used until about 1870. As soon as I saw it, I thought, now at last I have a "mellow" lens. It had evidently stood for years under the skylight, where the sun had free entrance, the glass having become quite pink, and the balsam between the lenses being much discolored from the brass work.

I tested this lens, and found that it had decidedly the effect of a color screen. I can easily imagine the boon it would have been, in the old days before the era of retouching, to the photographer who was a victim to freckles and auburn hair.



PROFILE STUDY BY FALK.



THE EDUCATIONAL VALUE OF AMATEUR PHOTOGRAPHY.

By Professor Randall Spaulding, Montclair, N. J.

The photographic amateur is coming to be as omnipresent and just about as popular as the universal book agent. No man ventures forth by day nor, since the advent of the magnesium flash, by night, except at the risk of having his physiognomy recorded in sensitized gelatine; and the more ridiculous the attitude and various accessories, the better our amateur seems to be pleased. By the public he is already voted a nuisance. Then, too, as to results, from the standpoint of art he must, in the majority of cases, be damned with faint praise. Our amateur is evidently a spoiler of plates and a squanderer of many strange and valuable chemicals. Thousands of pictures are produced annually that are lacking in all the known qualities of a good photograph and in some not yet discovered. With tilted architecture and staring faces, with tones sometimes bricky red and again slaty blue, and with general smudginess, they are indeed painful to behold.

This seems like a pretty strong indictment and I must not be understood as charging it upon a large number of our more experienced amateurs and many members of our best photographic societies. I have in mind a class that consists chiefly of boys in their teens. Among these the practice of photography is becoming more and more widely diffused, and we are led to ask with some apprehension what is to be the outcome of all this. Is there any adequate compensation for all this annoyance and waste?

First, the practice of any new art or recreation brings us into new relations with our fellows, and these relations have to be adjusted. In the rise of the "Fourth Estate" to its present dignity and power, many new questions concerning libel have arisen for solution, and yet our journalists have readily learned what is, and what is not permissible. So the ethics of photography, especially of the so called "instantaneous" sort, are receiving due attention. The laws of good breeding are being studed and brought to bear on this subject. The thoughtfulness and self-control that must be exercised in conforming to a just public sentiment will furnish a most valuable discipline. Every effort in overcoming evil, strengthens character.

But, secondly, the educational value that I am now chiefly concerned with, is of a different sort. It has come to be a familiar criticism that our school instruction is too purely literary in character. This criticism has already penetrated educational circles and is here and there bearing fruit in the incorporation of hand training with the usual school studies. The aim of this new element in our educational system, when rightly conceived, is rather disciplinary than utilitarian. No effort is made to teach a trade with a view to gaining a livelihood, but the effort is made to gain the power of doing things. The hand, the eye and the brain are trained together, and the executive faculty is thus strengthened by this co-ordination. It is of minor consequence what particular manual exercises shall be selected, provided they, as well as any, attain the end in view.

But what better discipline for our youth can be found than the manipulations of photography? It is doubtful if any other occupation can better train the eye to see and the hand to execute. The work is many sided. The mechanical appliances are so numerous as to give scope to the most fertile invention; the knowledge and handling of the numerous chemicals required, afford a most excellent laboratory practice. Perhaps in no other employment is the eye so well trained to see, and last, but not least, is the development of artistic taste. The boy learns as in no other way, the value of that most subtle and invisible agent, light; and in the various tones of his positives he receives a valuable object lesson in color. Furthermore, a signal benefit is derived from all these processes by the neatness, accuracy and patience that they imperatively demand. Were it necessary indeed to prove our proposition, the moral benefit involved might be much enlarged upon. The mistakes to be corrected, disappointments to be endured, and patience to be exercised before success can be counted upon with any degree of certainty, cannot but discipline and strengthen the character.

Let us not then criticise our young friends too severely. Let them monopolize our bath rooms at certain hours, fume their paper in our old trunks, and mount their prints upon the dining table. We shall do well to encourage their efforts and bestow kindly and judicious criticism upon their results. For all petty annoyances we find ample compensation in the educational value that every thoughtful man must recognize in the practice of amateur photography.

PHOTOGRAPHING ANIMALS IN MOTION.

By Henry Harrison Suplee, Editor "Mechanics," Phila.

The contributions which the science of Photography has made toward the solution of some of the problems relating to animal motion, have become widely known through the publication of the results of the work of Mr. Muybridge, and more recently of Colonel Sebert, in France. A little care in the production and study of photographs of animals in motion, however, made without the elaborate apparatus of these professional investigators, will prove of real interest and value to the thoughtful amateur, and a few notes based upon experience may not be without suggestiveness to those who may wish to examine the subject. Of course a rapid lens and a very rapid shutter are absolutely essential to secure even moderately satisfactory results, and it is surprising to discover how extremely quick the exposure must be, to obtain even fair definition of such a subject as a galloping horse, or bicycle at full speed. A Prosch Duplex shutter fitted with a spring fully three times as strong as that usually furnished, and a lens working with an aperture of $\frac{F}{5}$ to $\frac{F}{8}$ on plates of 26 and 27 Warnerke sensitometer, or 40 to 50 by Cramer's numbering, will enable the amateur to make some very interesting studies of animal motion, although of course only single examples can be made and consecutive exposures must be left for the more complicated apparatus.

In photographing the various gaits of a saddle horse, it is best to choose a field which is on a slight eminence, in order that the animal and its rider may stand out in bold relief against the sky, instead of being backed by foliage or buildings. The light must be carefully chosen, and as the object is one of speed and definition rather than the production of an artistic picture, the illumination is best when almost directly behind and above the camera, the light falling full and direct upon the passing animal. Too much care cannot be taken to secure a sharp focus, as such large apertures are necessarily fatal to great depth, and the definition is likely to be blurry enough in any case. Two fence rails lying parallel to each other on the grass will serve as a guide for the rider, and a sharp focus drawn on the horse when standing between them will answer for a number of exposures without involving the necessity of re-focussing again and again.

Probably one of the most common errors in photographing

such subjects is a hurried nervousness which almost invariably results in the beginner pressing the bulb too soon and finding on development that the horse's nose is just visible on the side of the picture, or that at least one-half of his body is yet to come. The personal equation in this matter is quite as important as in astronomical matters, but with this difference, that the observer must learn to correct it for himself, as no after correction is admissible in this work. The fence rails on the ground are of service again in this matter, for instead of sighting over the camera it is far better to watch the rider as he gallops past and press the bulb when the horse's hoofs are between the rails.

If very great distinctness is a matter of importance the image must be a small one, for in that case the relative motion of the animal upon the plate is much slower. The proportion is similar to that of leverage, for if we can imagine a line of light extending from the object to the plate, with its axis at the centre of the lens combination, it will be evident that the longer the lever arm from the lens, the less will be the velocity of the picture on the plate, and as the speed of the shutter remains the same, in both cases the blurring is proportionately less.

For leaping horses, jumping dogs, or any motion which is not uniform the results may be much improved by observing the slowest phase of the motion, and making the exposure accordingly. A horse just clearing a fence, or a dog bounding in the air is almost poised at the highest point and moving at a minimum velocity, and is at the same time in far the most effective and interesting position as far as a photograph is concerned.

Here again the temptation to make the exposure too soon, must be resisted and the bulb squeezed just as the descent appears to have begun.

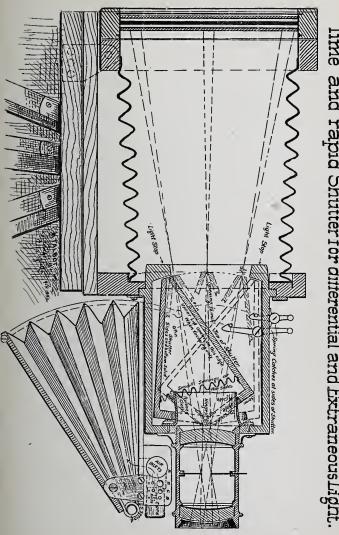
The development of these very brief exposures demands care and patience, especially the latter. Do not try to make a beautiful negative, but rather one that will make a good print, for the two things are not always synonymous. Use dry pyro, right from the can, and a saturated solution of carbonate of potash, and leave sulphite and bromide alone. Start with a developer containing about a mustard spoonful of dry pyro and two drachms of the potash solution, in five or six ounces of water, and let the image take its time to come up, keeping the tray screened from the light. Twenty minutes to half an hour is none too long to get full detail in the very briefly lighted shadows. Then pour off the developer, which will probably be rather muddy, and flow over a freshly mixed strong developer, with about two mustard spoonfuls of pyro and three drachms of alkali, in 2½ to three ounces of water, which should build up a strong plucky negative in five or ten minutes more.

A strong alum bath before fixing and a second alum soaking after the hypo, will give a good clear negative, and although the absence of sulphite will probably cause yellowness, the print will be none the worse for it. Sulphite seems to have a slight restraining action which does no harm in the case of time exposures, but with the most rapid work there is no time to be wasted, and the sulphite had best be omitted.

EXTRANEOUS LIGHT IN THE CAMERA.

By C. B. Talbot, Tacoma, Washington.

Too much unused light enters our outdoor cameras. Few pictures fail to show its effects. The round orb of light from the inside lens, diffuses itself on the inside of the camera, and in most cases, twice as much is inside as that being used, the unused light causing confusion and a dull image, giving about the same effect as when the focus cloth is lifted and the ground glass illumined partly from the backside. There should be no light in the camera, not being used. The aggravation spoken of is more common in wide angle than in long focus lenses, as the circle of light is greater, and in some cases only a part of it is being used, as on small plates in a larger camera. In the old times I had a camera in the glass room having a long black velvet hood, so that it would slide in and out on the lens tube, and when a "quarter" or "half" plate was put in the holders, the hood was moved out or in as required, so that a light circle only large enough to cover the corners of the plate entered. For in those days the exposures were from thirty to forty seconds, and sometimes seventy or eighty, and so all kinds of hoods, outside and inside screens, mats, etc., were used on the plate shield and between the lens and shield, the best remedy being the hood outside. With the quick exposures of to-day the fault is less than before, still the same care is required, and the more as the length of focus or size of plate increases. During the last year I have put in practice a remedy for the evil, and I think so well of it that I describe it for a more extended use. The hood is used as before on the outside, arranged to slide out and in on the lens tube, and set at a point where the light circle inside just covers the corners of the plate, but still all that part of the light circle outside of the plate is in the camera, and being there, the reflections injure the brilliance of the image on the plate. To get rid of that I tried a number of experiments and noted the effect on the image with a high magnifier and also with one of small power, and also only the eye, as to detail of small objects, diffusion, etc. Grass, letters near by, and the same at a distance in the same view. The images were surprising, the beauty and brilliance seemed much increased, for a larger diaphragm could be used with the contrivance than without it. The first experiment was tried by making a wedge shaped box, having a hole in the base large enough to receive the lens. The edge or front of the wedge, toward the object, six or eight inches in front, had a narrow opening about one-sixteenth inch wide, and long enough in a horizontal direction to admit the light required and no more, small slides being set to cover the ends of the slit as required. But on examining the inside of the camera, the image had not been interfered with, other than the orb of light had been reduced in a vertical direction and the horizontal measure was in the limit set. By changing the size of diaphragm, smaller, the vertical measure was reduced, and also the edges in the same measure, still no narrow band of light was had. So the experiment was carried to the inside of the camera and a similarly arranged screen placed behind the lens, having now the form of a diamond shaped box with slit in a horizontal direction before and behind the lens. The band of light now became narrow and was regulated in width by the size of diaphragm, and to use this it was necessary to cause it to rise and fall by gravity or otherwise, so exposing the plate. This arrangement yielded beautiful images, and the negatives had an amount of detail and individuality unseen before. That is, each object in its place seemed much as the eye sees it, instead of the flat paper or engraving like appearance, and the least object was in its place and perfect. This was most marked with small ones near by in the foreground, and brought the sharp field from twenty to forty feet nearer the camera than without it when the object focussed was 500' distant. The definition was much increased and in much the same way as when a small diaphragm is used. The most



Time and rapid Shutter for differential and Extraneous Light.

marked feature, perhaps, is the softness and exact or just relation to each other as to the force of light, a black object looking black, and not gray, and a light or bright object distinct and sharp, and if against the sky, distinct and not melted into it. Small fields of differing light in half tone were distinct and clear and a better cloud scale seemed possible. After some trial, it appeared that the outside screen or hood could be dispensed with and the inside one only used. The engraving shows the arrangement of the interior as used, the underside of the screen box being connected with an air bellows below the box carrying the lens. This box, about four inches square, or as required, is fitted to the camera the same as a lens board to the front, and the bellows below outside. A small block of wood has a three-fourth inch hole bored in it, connecting with the inside of the bellows and in the end opening into the air, a common cork is placed so that the bellows will fill easily with air when the flaps of the screen are opened to focus, (Opened wide only when focussing.) To use it, the bellows is closed up, it is now allowed to fall open, when unlatched, by a catch on the side and top, and falls faster or slower as a number of small holes are unstopped in the wooden block holding the cork. Several holes are made of varying size, from the diameter of a fine needle to an eighth of an inch. The bellows holds about thirty cubic inches of air, and the opening of the smallest hole will cause the light belt to descend across the plate in about three seconds, but if the larger ones are used, quicker in proportion to their size, or it may become a "snap shooter," by taking the cork out and allowing the air to enter quickly. There is another use still, that of giving the foreground more time than the sky. This is done by opening the smallest hole first, securing a slow movement of the illumined portion at the top of the plate, and when the movement has progressed far enough, opening a larger hole when the sky and clouds in the lower part of the plate are more quickly passed over, and many beautiful clouds are caught that way which would elude a shutter of ordinary construction. By this means green grass or evergreens can be given time to make good pictures without over exposing the sky. I find an ordinary foreground of this character requires from six to eight times more exposure than the sky with light clouds, and from ten to twelve times longer with the open blue sky. After a few trials, the time can be controlled with sufficient

exactness to make good results certain. Care should be had to grease the corks or small pegs in the holes, so that when they are pulled or stopped the camera will not be moved. The position of the light band can always be known by the position of the bellows, as quarter, half or fully open, etc. The width of the light band on the plate is determined by the size of diaphragm. A small diaphragm making a narrow band and a larger diaphragm a wider band, etc., and has the same effect as to time as if no screen had been used; but the varying of light on the plate cannot be regulated as well, as the band covers the plate too far to be kept well in hand. So better control is had with small diaphragms and a slow descending motion across the plate. Gravitation alone, is not quick enough for rapid work, so a spring is added to hasten the filling of the bellows when rapidity is desired, when it works as quickly as any ordinary shutter. keep the flaps or sides of the screen open, a small catch is placed on the inside of the box, so that it engages with the upper half and holds it open as long as required, the bottom part descending with the bellows, the hinge in the base of the box allowing it to open and close by means of some small rubber bands or springs with ends fastened to the bottom and top sides near the hinge and lens, so set as to constantly hold them together when not open for focussing.

By means of the device described only the light actually being used can gain admittance to the plate chamber, and can be so regulated that different times of exposure can be had on the same plate, and also the speed of the exposure can be certainly controlled, and when used with skill will yield beautiful results, and such as can be attained in no other way. Any mechanically inclined man can make one in a day, using a part of a cigar box for the inside screen box or flaps, and the bellows boards and lens box of the same material, made tight and light proof, and blacked well on the inside. The bellows can be made of thin rubber cloth or sheepskin, securely glued to the boards and clamps on the edges. Before exposure the bellows is closed, and by so doing the shutter raised into the upper part of the box, where it is latched by the longer of the two catches. The shorter one holds the upper flap up and open, while the lower half is in the bottom of the box while focussing. Without this catch, the little springs near the hinges would keep the two flaps close together and the whole image could not be seen at once on the ground glass. If a short focus lens is used, the device would have to be arranged to work inside the camera and the control of it made through the front or lens board, so that the narrow slit between the flaps will then be close to the plate, and having the general arrangements similar to those shown.

PREPARING FOR AN EXHIBITION.

By A. J. Treat, Sceretary Pacific Coast Amateur Photographic Association, San Francisco.

The first thing to suggest in giving hints for the preparation of work intended for an exhibition is, avoid presenting those views which have only local interest. It is a difficult thing to persuade a man that his dog, if he is a bachelor, or his baby if he is a married man, is not as interesting to every one as it is to himself. Such subjects seldom lend themselves to graceful composition. Let the exhibitor, therefore, beware and present only those views which have pictorial value or great local interest. An exhibitor must remember that he is publishing his work, and that it will be compared with the work of others, harshly or favorably, according to his knowledge of composition in the selection of a view and the arrangement of subjects; his skill in the development of the negative and making prints therefrom, and his taste in mounting them.

Having obtained a good negative of a good subject, the problem is: How shall it be reproduced so that the effect of Nature existing at the time it was taken, be suggested? No one process, however good it may be, is the best for all negatives. A burnished print is objectionable, as a general rule, because the polish presents a surface, and prevents one from imagining they are looking into a view; but in a few instances this polish, by making the shadows transparent, gives better results than other processes which may make certain subjects appear "stale, flat and unprofitable."

One should avoid printing by a method giving a color entirely impossible to the scene represented. A blue print of a landscape is particularly objectionable if there is much mass; but, if the view is made up mostly of half tones and has distance, it is possible for a blue print to give a really fine result, as the color lends to the picture an effect of atmosphere and the suggestion of distance. If it is desired to get the effect of early morning, when

gray tones predominate, the bromide or platinotype process should be used. If it is desired to suggest the warmth of an afternoon landscape, then the sepia platinum, or silver printing upon plain paper is the most suitable.

The following formula gives brillant blue prints. The solutions are stronger than those usually recommended, but the results are better than those usually obtained.

No. 1. 900 grains ammoniacal citrate of iron, 4 ounces of water.

No. 2. 600 grains red prussiate of potash, 4 ounces of water.

Mix equal parts of one and two as desired.

With a soft sponge, previously dampened in water and then squeezed out, swab this solution over the paper, going backwards and forwards, say once east and west and then once north and south. This paper will not give clear whites after the second or third day. Clear whites, however, are not always desired. Fine results are secured by using this paper after a week old. Then the blue is not so conspicuous; the tones are more of a gray, and if a heavy grade of Whatman's drawing paper has been used the effect of atmosphere is excellent. Blue prints are well adapted to marine studies, and if upon a paper with a grain, an effect of aeriel perspective is obtained, not to be equalled by any other process.

BROMIDES.

When asked how I secured the bromides shown at an exhibition of the P. C. A. P. A., I readily told the secret: Out of every ten prints of the same subject, pick the finest. If one is careful and keeps a note book of exposures, as he should do, such foolish extravagance is avoided. My practice has been to give a long exposure; to use more than the quantity of bromide suggested and to dilute the developer about one-third. In this way rich tones are obtained and there is a reserve, for, if the print has been under exposed, a much stronger developer can be used.

The beauty of bromide work is the amount of dodging one can do. By shading any part of the negative with a piece of cardboard during the exposure, "trembling" it to prevent sharp outline, obstinate high lights get their share of the exposure. If in development a shadow "pops up," it can be sub dued with the acid solution. A camel's hair brush and a developer, proportioned as strong as one part of iron to four of oxalate if necessary, can then be used to bring out clouds or other effects. This dodging applies equally well to enlargements. I

have one negative in which the foreground receives ten seconds exposure and the sky fifty. The foreground comes up quickly, and is lightly washed with acetic acid solution to stop development; then the brush and a strong developer is used to bring out the clouds in the sky.

For a long time I got a straw colored sky in my bromides which closely resembled the warm tone of certain etchings. I afterwards found it due to washing all night in water having a reddish tinge. The effect is so good I have never tried a remedy. Perhaps a similar result can be artificially secured by soaking the prints in a weak solution of tea or coffee.

SILVER PRINTING.

Although sometimes a burnished print upon albuminized paper will give fine effect by the depth imparted to the shadows, it will generally be found that a rich silver print upon plain paper gives the best average result.

The best paper for the purpose is that used for the finer etchings. It is made in Japan and comes of various grades. It must first be sized and salted by floating about two minutes upon the following solution:

Water,	1	ounce
Gelatine,	5	grains.
Chloride of ammonium,	40	66
Chloride of sodium,	40	4.6
Chrome alum.	4	4.6

First dissolve the gelatine in warm water; then add other chemicals, and filter.

When perfectly dry, the paper should be floated for two or three minutes upon a weak silver bath, thirty or forty grains to the ounce. After fuming it is printed, washed, toned and fixed in the regular way. The toning takes place rapidly; any good bath may be used, and very little gold is required. The tones vary from a sepia to a rich dark purple.

This process gives very fine results on Japanese tissue paper. When floated upon any solution this paper spreads out instantly. It is difficult to handle when wet; care should be used that it does not lap over on itself, as it is impossible to separate it. The printing is the same as with ordinary paper, save that the prints should be a trifle darker. Toning takes place even more rapidly than with the India paper, and it is best not to have more than

four prints in the bath at one time. The prints look best when toned to a sepia, so do not carry too far. After ten minutes in the hypo, the prints are soaked in a bath of common salt, before the final washing. To dry them, it is well first to take up the surplus water with blotting paper, and then to spread upon a clean towel. If the print should lap upon itself, don't try to separate it; put it back in the water, and it can be straightened with a little care.

MOUNTING.

In what dress shall the print appear. As a belle will look even more charming in becoming attire, so may a good print be bettered by being properly mounted. Notice the harmonious effect of a room furnished in one tone throughout. Let this give you suggestion for the scheme of presenting your work, both as to mounting and framing. Beware of strong contrasts. A light print should have light surroundings, else the high lights will appear chalky, and a dark print should have a dark mount or the shadows will appear blocked.

Blue prints are most attractive when mounted upon a paper having the same tone. If upon cardboard they will be improved by having a blue line drawn around them.

The soft neutral gray of the bromide lends itself to various schemes of mounting. The simplest and perhaps the best way to present them is to mount upon Whatman's drawing paper with a gelatine mountant. Do not cut the edges of this paper with a blade; use a paper knife, that the hand-made effect of the paper will be preserved.

Bromide and other prints will not cockle when mounted on thin paper by the following solution:

Fill a graduate up to the 3 oz. mark with cooking gelatine. Soak in cold water until soft, then dissolve in a water bath. Add three ounces of alcohol and an ounce of glycerine. Strain through a piece of coarse cloth and it is ready for use. It will keep for weeks but the addition of a small pinch of salicilic acid dissolved in alcohol will make it keep indefinitely. The secret of using a gelatine mountant is to have plenty of it and to keep it hot. An oil stove is handy for this purpose. Apply with a wide brush, using a stick in the cup to "wipe" the brush on. Before pasting, place the print upon a piece of paper cut larger than the print and use a fresh piece each time.

Centre the print on the mount by using a mask with an opening larger than the print. Adjust the print inside the opening of this mask and mark two corners with the point of a pencil. To "square" a print upon a mount turn it face down, then the image will not disconcert you.

To mount with gelatine, one must work quickly; there can be no shifting after the print touches the mount. Holding the print by the edges, adjust to the pencil marks. Rub quickly into place with the palms of the hands. With a thin piece of paper and a pecket knife, rub the print down, giving particular attention to the edges. Put blotting paper between the prints as they are mounted or they will wrinkle. To put a print upon each side of a mount let the first one dry thoroughly. If the solution becomes too thick, thin with alcohol and water, equal parts.

A simple "cut-out" gives a very good effect and is simply made by cutting out of proper material, an opening a little smaller than the print. For cutting use a sharp knife and a piece of glass underneath. Hold the knife aslant so as to produce a bevel. By mounting what is known as charcoal paper (to be obtained at any art dealer's store), upon common cardboard with starch paste, a cut-out can be had of the desired tint.

What is known to framers as the English mat is very effective for any kind of print, providing the color of the mat is in keeping with its general tone. These mats are made by cutting an opening of the desired size out of cardboard and then covering the cardboard with paper. First thoroughly dampen the paper with a sponge. Place the cardboard upon it and cut the paper so it will lap over on the back of the cardboard. Glue these laps with prepared glue. In cutting the laps do not go quite up to the corners, else they will appear too sharp and the cardboard will show through. If the print is already mounted, place this mat over the mount and glue both together. This method will give you a print mounted in the most serviceable and attractive manner. Before tissue prints can be so mounted, they must first be dampened with a sponge; being of a tough material they will stand this handling much better than supposed. After dampening the print, moisten its edges with glue, then adjust the mat into place. When dry, the print will be found stretched tight and will present a much better appearance than its previously wrinkled condition would seem to warrant. To protect the print, the back of the mat should be covered with cardboard or heavy paper.

A very simple and attractive way to mount India and tissue prints is that adopted by art dealers for etchings. The prints are simply touched with glue at the corners and fastened upon plain cardboard. Before this can be done with either India or tissue prints they must first be stretched by being dampened and fastened to a board by running glue around the edges of the print. When bone dry, cut loose with a sharp knife and the print will be found "as flat as a pancake."

These plain paper prints look particularly well with a margin, as the delicate tint of the paper harmonizes with the warm tone of the print itself. It is therefore best to mat the prints in the printing frame. They will also be improved by having a line drawn around the edges of the print; for this purpose a steel pen and some brown water color is best. The rough line of a writing pen is better than that of a ruling pen for this purpose, because the line is not so stiff.

Prints made with a margin and prints mounted upon any kind of paper are made more attractive and have a more finished look if given a plate mark. Some accomplish this by using a piece of metal and squeezing upon the mount in a press. It is much easier to get this effect with a piece of cardboard and a pocket knife. Cut out a thin piece of cardboard as much larger than the print as you wish your margin to be. Round the corners slightly. Equidistant from the print make points with a pencil. Place your cardboard on top, squaring it to the marks. Turn over without letting the cardboard slip. It takes some knack to do this, but by placing one hand flat on the cardboard and sliding it and the paper to the edge of the table without slipping, the other hand can be put underneath and the whole turned over quite easily. If the print is large, place a flat iron on top to hold it in place. With the finger nail, or the end of a pocket knife, go around the edges, creasing the paper sharply or softly according to requirement. This will give a plate mark for all purposes exactly like that obtained from a copper plate. It is difficult to describe this process which can be shown one in a few seconds. The results are worth the few failures, due to letting the paper slip, but the process is really so simple that few failures will result after the first attempt.

A good effect is made by creasing a line around the print with the rounded end of a Yale lock key. As it is impossible to plate mark cardboard, save by heavy pressure, this is a good way to relieve prints so mounted. Mats and cut-outs are improved by having these crease lines around the openings, just at the edge, or further away, according to taste.

Silver prints which have been slightly overdone, can be made tolook well by putting in optical contact with glass. Dissolve a few slips of gelatine in a couple of ounces of hot water. Take the print, which must be previously soaked in slightly warm water and place in contact with the glass by using a squegee. Prints so mounted look very well with a mat made of leather. There is a tough Japanese paper made to imitate morocco which is also very well suited to this purpose.

I have taken pains to call particular attention to prints apon Japanese paper, for, in my experience of all the processes, that one has given the most satisfaction, both to myself and to those of my friends who, by years of devotion to the artistic, have a critical eye for agreeable effects. The process is inexpensive, the prints are quickly produced, and if properly made are permanent.

These suggestions have extended to a greater length than should appear in an annual mainly devoted to terse articles; but they are written in the belief that too little attention is paid to printing processes, and that too little attention is given to the print after it is made. The work of the painter is practically over with the last stroke of his brush; but, with the ambitious photographer, the production of the negative is only a third of the work. The painter sends his production to the framer, and, save for the selection of the frame perhaps, that is the end of his labor; the artist photographer who would have his work appear to the best advantage should do the rest of the work himself, that he may get the very best effect out of each print.

It takes time and trouble to make and properly mount prints by the processes herein described, but it is hoped those who possess the patience to read these lines, have negatives worthy of that trouble. If they have, and are willing to spend the necessary time over their productions, they will be contributing, not alone to the progress of photography, but to a higher realm—the domain of the fine arts.

SILVER PRINTS ON ROUGH SURFACED PAPER.

By Ellerslie Wallace, M. D., Philadelphia.

For copies of paintings where there are large masses of light and shade and heavy contrast, particularly where the work is of large size, some very pleasing effects may be made by sponging drawing paper with a salting solution of say four parts of gelatine, five parts of chloride of sodium and 480 parts of water, after which the paper is allowed to dry spontaneously. It is sensitized by applying a solution of ammonia-nitrate of silver prepared as follows: Six grammes of nitrate of silver are dissolved in forty-eight c.cm of distilled water, to this is added strong ammonia, drop by drop until the brown precipitate re-dissolves. If too much ammonia be added, drop in a little more of the silver solution (a small quantity of the latter should be set aside for the purpose).

The salted paper is fastened on a board of slightly smaller size, by folding the edges over and securing them with black pins at the back. A few drachms of the ammonia nitrate solution being poured into an egg cup, a mop of cotton or brush is dipped into it, applied to the upper edges of the paper and gently swabbed down with a criss-crossing motion. If a brush be used, it must not have metal in any form about it. The board carrying the sensitized paper is now stood up to dry, the drops of silver accumulating at the lower edge being removed with bibulous paper.

The proofs should be considerably over printed and toned in a weak gold bath neutralized with carbonate of soda. By interposing a cut-out between the negative and the paper, the print may be made with a white border, and as the paper does not curl, it may be kept without mounting.

It will be seen at once that the preceding is merely a method of plain silver printing applied to rough papers. As already hinted, it is quite unsuitable for small work, the fine effect being obtainable only where the individual masses of light and shadow are large enough to produce breadth.

The above process, if properly worked, will yield results in no respect inferior to platinum in quality. It is essentially the same as one given by J. N. Biggs of London.

INTERIORS.

By Herbert O. Warner, Hartford Camera Club.

There is no more interesting field of study for the amateur than that of photographing interiors, and especially during the Winter months, when the weather interferes with outdoor work, this branch can be taken up with pleasure and profit. Almost any one can easily learn to make photographs, and how many there are who advance no further, but more or less study of one's subject is required to produce a picture. The necessary study can generally be given to an interior, more easily than to a landscape, and, although that which we often see is apt to appear commonplace, we can find, if we look carefully, subjects right at home that are well worth our attention.

A common fault with beginners in photography, both in and out of doors, is that of trying to include too much in the picture, and he who knows what to omit, has in cultivation a habit which will serve him well in picture-making. It is of the arrangement, the artistic as well as the mechanical side of the question, that I want to speak, as there are few rooms which will photograph well without, at least, a slight arrangement for the purpose. "arrangement" I do not mean to imply the massing of all the "pretty" things in one corner and then photographing the collection, nor the complete overturning of a room. Set the furniture easily—as Oscar Wilde is quoted as having said, "allow it to occur"—with due regard to perspective and the exaggeration thereof, especially when using a wide angle lens. For the latter reason be careful about placing a large object too near the camera, and also be particular to present the best side and position of a table or chair as seen in the camera. Do not trust to any other view until experience has taught you how it ought to look, for your lens is the eye in this case and it renders failures and successes with equal fidelity.

I will not enter into a discussion here of the theoretical and practical advantages or disadvantages attending the use of a wide angle lens, but will merely say that, when it can possibly be used, I prefer a lens of medium angle, as I think it gives a more truthful representation of the subject, as seen with the eye, and, consequently, is more satisfactory in every way.

A good many of the simple rules for photographing other subjects apply to interiors, and they should be borne in mind, as the ease with which the subject can be "composed" makes it possible to produce most charming results. Great care should be used in leveling the camera and adjusting the swing back—a universal level being very useful in obtaining a correct position.

It is sometimes quite difficult to focus a dark subject and determine exactly the limits of the picture. There are various ways of overcoming these difficulties. A white object, as a handker-

chief for instance, moved about will show how large the field is, or, in the evening, a lighted candle will serve the same purpose. For my own use I have a large white card with FOCUS in black letters three or four inches high, cut from a poster, which I place upon any convenient object—reversed for legibility—and find it very useful. I can usually see it nicely in day light, and at night a combination of the card and candle affords a beacon which cannot be missed. This card I always keep in my carrying case.

The light and dark objects in the room, bric-a-brac for example, should be placed if possible, so that the background will throw them into prominence—remembering the value of the colors if you use an ordinary plate. The darker furniture will look well near the windows, while the lighter articles will serve

to brighten an otherwise gloomy corner.

Be particular to avoid, if you can, bad lights and reflections in the glazing of pictures, in mirrors and on paintings. If you use flash light, place it quite high in order to avoid disagreeble shadows. When obliged to include a window in the picture, leave the shade at the usual height and cover the space below it with paper or light cloth, giving a short exposure without the screen just before finishing. As I said before, a great deal depends upon the omission of undesirable portions of a room, and the eye should be trained to select at a glance, the available field. For example, one end of a mantle may add to a picture when the whole of it would spoil the effect. A pleasing view may be through a doorway into the next room; a fireplace with a chair drawn up to it, and, perhaps, a kettle hanging over the blaze; a corner set with the appliances for serving afternoon tea. The same idea can be borne in mind that is frequently used to good effect in the treatment of landscapes, that is, leave something to the imagination. As a turn in the road suggests possibilities of equal or greater beauties beyond, so a partly drawn curtain or a door left ajar may give a glimpse of an adjoining room that will make us, as Sam Weller said, "Vish there vas more."

The length of exposure necessary, varies so much, taking the subject, lens and plate into consideration, that it is impossible to give any rule for it, and I am constrained to repeat the advice found in most books and circulars of instruction to the effect, that experience will demonstrate the proper course to pursue.

This is poor comfort to the beginner, who is enriching the stock dealer at the expense of his own bank account, I know, but there are some things about photography that a man must find out for himself, and if he goes about it in a reasonable, practical way to begin with, he will save money in the end. It should be remembered, however, that the light is so much weaker in the house than out of doors that there is far greater latitude in exposure, and, for that reason, one is much more apt to under time than to overtime an interior.

Slow development, with a rather weak developer, gives a more evenly developed plate than more vigorous treatment.

Now a word as to toning. Do not tone a print of an interior, to take an extreme case, wholly or partially of marble, as you would a warm landscape. Suit your treatment to the subject in developing, printing and toning. In other words, think continually, for the man who does not think is hopelessly in a rut and should exchange his camera for "something easier" at the first opportunity.

THE PHOTOGRAPHY OF PROJECTILES DURING THEIR FLIGHT.

By Lieut.-Col. O. Volkmer, Vienna.

For the student of ballistics, the experiment is of great interest, to fix photographically as an instantaneous picture a projectile during its flight. The present advanced state of photography, by the application of very sensitive dry plates, has contributed to the solving of this problem.

In Austria and Germany such experiments have been made repeatedly since 1884 by Professor Mach of the technical high school at Prague and Professors Galcher and Kiegler at Fiume in Austria, who, by their views taken in a darkened room, and with instantaneous electric illumination of the flying projectile, cleared up and explained the aerial proceedings around the same, while Anschütz in Germany has attempted to take the flying projectile at several stations of its course, by means of a so called series of views, and in daylight, in order to obtain the same result.

Mach and Galcher commenced their experiments with small arms and afterwards worked with cannon. The experiments

taking place in a dark room, they left the camera open and exposed only the flying projectile at the moment of its passage by an instantaneously flashing electric spark. The projectile effected the production of the illuminating spark at the proper place. By their experiments with small arms, they demonstrated the fact, that a condensation of the air in front of the projectile -- optically provable-begins only when the rapidity of the flying projectile exceeds the rapidity of sound, 340 miles per minute. In the latter case the boundary line of the air which is condensed in front of the projectile, is seen on the photographic picture to form a hyperbola arm encircling the latter (the projectile), whose top is before the head of the projectile and whose axis lays in the course of flight; further, there appear in the channel behind the projectile, peculiar clouds or circular motions. These experiments have therefore demonstrated that the projectile produces motions in the air similar to those of a ship in the water. The front and back wave boundary of the water can be distinctly seen and not less the whirls in the keel-water.

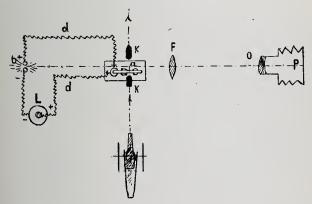


Fig. 1.

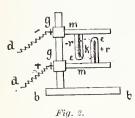
Galcher now experimented towards the end of 1888 and in the beginning of 1889 with a 9 centimeter steel field piece, at the shooting place of Pola with projectiles of 23 centimeters in length and an initial rapidity of 448 miles. This experiment is illustrated in Fig. 1.

The closing wire of a loaded Leyden jar I, is interrupted at a and b. If the projectile passes at a in front of the telescope ob-

jective F and between the wires of a so called net apparatus which are surrounded by glass tubes, it will break the same and at a and b will appear the discharging spark necessary for the instantaneous illumination of the projectile. The light-rays collected with the aid of F fall on the objective of the photographic camera at O and impress at P upon the sensitive plate the picture of the flying projectile.

The telescope objective F has an opening of 21 centimeters with a focal distance of three meters; the photographic objective is a rapid rectilinear Dallmeyer.

The interruption of the electric circuit at a for occasional



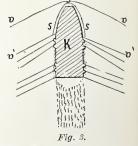
electrical closing, and thereby for the formation of the discharging spark at b, is produced in the following way, as shown in Fig. 2:

An insulating bar gg is fastened upon a support bb; mm' are brass arms with the conducting wires dd thereon; r and r are glass tubes fused at e and e, with strong metal wires enclosed

therein, which at m and m come into contact. If the projectile passes over through a, it will break the tubes, give instantaneously with r and r metallic contact, liberate therefore at b the discharging spark, so that by this instantaneous effect of illumination the projectile will appear as a fixed picture upon the plate. After this installation had been optically adjusted, and the Leyden jar and the gun had been loaded, a current was

closed by means of a key, which opened the photographic camera electro magnetically; a second current was also closed automatically, which effected the firing of the cannon. The first current was now at once interrupted and the camera closed thereby.

The experiments with these projectiles showed now conditions analogous to those of the small firearms. The head wave appears, as shown by Fig. 3, like a solid broad hyperbolical stripe



and extends to the cylindrical part of the projectile and is therefore bounded by vv v'v'. Within this space a peculiar boundary s s surrounds the head.

Besides the head wave, the pictures show also a number of other waves, which proceed from the guiding part of the cannon. These waves, in the opinion of *Galcher*, might originate in an analogous manner by friction, as the waves formed on the surface of the water by the wind. The course of these wave stripes is quite a typical one for the 9 centimeter projectile, as can be seen in Fig. 3. Around the front pair of the guidance rings appear three stripes, which diverge somewhat, and in the same way on the back pair of the guidance rings. On the bottom of the cannon one observes a plumage-like appearance originating from the entrance of the air into the barrel. These are certainly interesting facts for the student of ballistics.

In quite an analogous manner Professor Mach of Prague has experimented at Meppen in Germany with a 4 centimeter projectile of 9.8 centimeters length and a rapidity of 670 meters per second, with exactly the same results. The electrical apparatus for the spark formation and the firing of the cannon was arranged somewhat different from that of Galcher, which it is hardly necessary to describe it here in detail.

Anschütz of Lissa in Posen, Germany, experimented in September, 1888, at the shooting place at Buekan, near Magdeburg, to catch artillery projectiles at great rapidity and with daylight illumination, during their flying course, sharply upon the photographic plate in several succeeding phases.

Two difficulties had to be overcome by taking these views in daylight, namely, to discover the corresponding time of exposure and to expose at a time when the projectile is at a certain place. Anschütz believed that he could accept the time of exposure to be 0,000076 seconds for a projectile with a rapidity of about 400 meters. The projectile makes at this time a distance of about 3 centimeters, and it was therefore to be hoped that by placing the apparatus at some distance, thus reducing the visual angle, that the projectile would appear sharply upon the plate.

Regarding the surmounting of the second difficulty, Anschütz constructed his apparatus in such a way that the projectile itself liberated the instantaneous shutter of the apparatus by tearing through a wire netting and thereby causing the interruption of the electric current, and in this way, with regard to the time necessary for the liberation and activity of the instantaneous shutter, he had the certainty of knowing that the projectile was at the proper place when the opening of the instantaneous shutter passed the objective of the apparatus directed to that place,

The place from which the view was to be taken was at a distance of 113 meters from the wire frame. At this distance a white background was erected, against which the flying projectile would set off sharply, and on the other side of the shooting line, at a distance of about 80 meters vertically from the same, was the photographic apparatus. Anschütz's intention was to take the projectile in four phases; four shutters were therefore accordingly arranged and the apparatus all connected, set up, so that the one following the first worked about 0.009 seconds later, and so on. It required altogether 0.028 seconds, during which time the projectile could make a distance of about 11 meters. The background was therefore made of a length of 13 meters, and a tube, measuring 12 meters, was adjusted on the same just below the shooting line, so that at each of the four views it could easily be recognized at what place the flying projectile had been at the time the view was taken.

Notwithstanding the many difficulties on account of the narrow shooting place, he succeeded in obtaining quite a sharp picture from the first apparatus of an 8.5 centimeter projectile of 25 centimeters length, and thus to prove the possibility of the proceeding. Unfortunately this remained the only experiment, and it would be indeed very desirable if Mr. Anschütz should continue these experiments on a larger scale.

There is no doubt that this still young art of instantaneous photography is destined, executed by practical hands, to develop in such a way that the outward and even the inner ballistics can be laid down clearly. The solution of this problem is certainly of great interest for the students of ballistics, and the results so far obtained justify the hope of obtaining a precise solution of the questions involved.

CAN SILVER PRINTS BE PERMANENT? By Capt. Abney, C. B., D. C. L., F. R. S.

This is a point which is always being discussed, but which is never decided. I propose to add a small contribution to the discussion giving my own views on the matter. Let me commence by saying that I have grave doubts as to the stability of any prints taken on albumenized paper, since they are dependent for their depth and vigor on the combination of silver nitrate with albumen, an organic compound, which, without any in-

tervention we know discolors in the dark, to a yellow or brown compound, very much the same as our skins darken and vellow, under the influence of the caustic, even when shielded from light. The use of hyposulphite of soda in the fixing bath, at once introduces another element of fading. organic salt of silver is, it is true, soluble in hyposulphite when freshly prepared and then of course all the dissolved organic salt of silver can be done away with. But when there is a film of coagulated albumen on the paper the facts of the case are somewhat different. There we must necessarily have a portion of the dissolved albumenate clinging to the coagulated film and steadily refusing to be washed away even by prolonged washing, and when damp and acid are present we have this organic hyposulphite of silver decomposed and the sulphur yellow produced, besides an oxidation of the metallic silver which was produced from the silver chloride and fading is the result. The writer has found that by putting in sulphite of soda which he suggested three or four years ago much greater stability is obtained. He has hundreds of prints in his possession which he fixed with this substance, (indeed he always uses it when a silver print is wanted) and finds that in the large majority of cases the print is unchanged, and in others the whites have become a little yellow, but that the blacks remain intact. To his mind the use of sulphite for prints is a great step towards permanency. But prints in silver can be permanent. Given an organic salt of silver which is soluble in hyposulphite of soda and which is not imprisoned in albumen, the chances of permanency are much greater. This we have in the collodio-citro-chloride emulsion first introduced by the late Mr. G. Wharton-Simpson. Here we have a crystallizable organic salt of silver having a very definite formula, together with silver chloride, both of which are acted upon by light. These salts lie in an eminently porous film of collodion which does not combine with silver, and consequently the hyposulphite of silver can be thoroughly washed away leaving an image which is stable and containing no germs of fading. The writer has in his possession and made by himself more than twenty years ago, prints which are as brilliant as they were when first produced. In this case the organic salt, the citrate of ammonia was in slight excess. The emulsion having been washed, and no silver nitrate being in contact with the paper on which the prints

were produced, the prints have seen all climates from hot to cold and been exposed to damp and light as well, but they all as before said, are perfectly brilliant. Some years back the writer brought out the gelatino-citro-chloride in printing purposes and the process has been appropriated under various disguises of nomenclature and printing papers issued to the public. Obernetter's paper and the aristotype, it is believed, are simply gelatinocitro-chloride and they have not yet had time to be called permanent. They probably are. The silver nitrate is not in excess in the emulsion as the writer pointed out when he brought out his original process. The one indeterminate point is, whether the colloidal nature of the film in which the salts are held "in situ" will permit the thorough extraction of the soluble salts. It is very probable it is, and if so the gelatino-citro-chloride emulsion process should be used in preference to the albumenized paper process. The collodio-citro-chloride is proved permanent and would be recommended if it were not so difficult to work owing to the unequal expansion of the paper and the film.

"TONALITY" IN PHOTOGRAPHS.

By Talbot Archer.

By "tone" or "tonality" is here meant the correct rendering, in black and white, of any natural object—as a landscape, a portrait, etc.

It may be said that every object in nature possesses more or less color. That it will be practicable ever to obtain permanent photographs in natural colors, appears to me to be in the highest degree improbable. It is true that it is even now quite possible to take a photograph which shall show such colors; but the complex molecular groupings on which the colors depend, are destroyed instantly when we attempt to "fix" such photographs; while if they are left unfixed, they are obliterated by the action of light.

White light is composed of all the colors of the rainbow, and when an object appears red, it is because it reflects the red rays contained in the sunlight which falls upon it, absorbing all the others. Other objects are yellow because they reflect yellow light, while blue objects reflect blue light, and so on.

Now these different colors impress our eyes very differently

some making a much greater impression than others, and we say that they vary in *luminosity*. By passing white light through the triangular piece of glass called a prism, it is spread out into a band of colored light, like the rainbow; this band is called the spectrum. The luminosity of the different parts of the spectrum has been very carefully measured by Abney and Festing, with the following results: Red = 22; greenish-yellow = 122; blue = 11; violet = 1.

But these colors produce a very different chemical effect upon our dry plates, their powers in this respect being represented by the following numbers: Red 0; yellow 1; blue and violet 120.

Some may wonder how it is that we get any images at all of red, yellow and green objects, since the special light which they reflect produces so small a chemical effect upon the gelatine plate. But the fact is, that all substances reflect a small amount of white light, as well as their own special color, and in addition it is seldom that the color of any object is pure, e. g. most red substances reflect a little blue light, which is not noticed by our eyes, but which affects our plates.

The result of this difference between the luminosity and the chemical effect of the variously colored rays, is, that all photographs taken on ordinary plates are of wrong tonality and more or less unnatural.

Fortunately a remedy has been, or rather, let me say, is being found for this by what is known as orthochromatic or isochromatic photography. The father of this method is O. H. W. Vogel of Berlin, who in 1873 found that when silver salts were dyed with certain colors, they became sensitive to light which these colors were able to absorb. Vogel's work was done with bromide of silver in colledion; Altout-Tailfer of Paris modified the process to suit gelatine plates, and patented it in France and England in 1882-3.

The plates which are now sold in England and in America as "isochromatic" or "orthochromatic," are not able to render the tones of any subject perfectly, for they are not color-sensitive in the same ratio as the human eye, being still too easily affected by the blue and too little by the red. But by using a screen of pale-yellow glass in the diaphragm slit, this defect can be corrected, and in any case the negatives of objects obtained on these plates (supposing the exposure, development, etc., to have been correct) is superior in tonality to the impressions from the same objects obtained on ordinary plates.

In case any readers of this Annual may be unable to readily obtain these color-sensitive plates, we will give an easy method by which any gelatine dry-plate can be orthochromatized. Pure erythrosine (one of the so-called "eosine" dyes) can be obtained from Messrs. Brooks, Simpson & Spiller, manufacturing chemists, London; but if only the dye as ordinarlly used can be obtained, it should be purified as follows: dissolve ten grains of erythrosine in ten ounces of water, using a glass flask and aiding the solution by heat. Add twenty minims of nitric acid, which will precipitate the dye as a reddish powder. Filter this off and wash it well. The dye is now insoluble in water, but can be redissolved by pouring four-and-a-half ounces of alcohol upon the filter paper. This gives an alcoholic solution of erythrosine, of the strength of two grains to the ounce.

For use, add half an ounce of the alcoholic dye solution to sixteen ounces of distilled water, and to this add one drachm of ammonia.

In the bath so made up, soak for two minutes each, dry plates of any good brand; I prefer to use slow plates for this purpose. Stand the bathed plates on blotting paper to dry, in a dark, warm place. As the plates, after bathing, are very susceptible to light, only a faint ruby light should be used to conduct the operation by, and they must be dried in absolute darkness. Any developer can be used for such plates, but they must be screened from the light during the process as much as possible.

Those who have never used color-sensitive plates for photographing pictures, flowers, fruit, etc., will find the results obtained on such plates to be infinitely superior to anything which can be obtained on ordinary plates; in portraiture their advantages are almost as great—fair hair is truly rendered and freckles and skin defects are minimized. In landscape work there is a different action of the green and yellow and a lightening of their tones. With these advantages no one can doubt that orthochromatic plates are "the plates of the future," and the future can become the present for any one who is willing to avail himself of the method described above.

INTENSIFICATION OF GELATINE PLATES WITH SILVER.

By Francis T. Beeson, England.

Since my communication to the first ANNUAL I have almost entirely discarded the use of mercury for intensification,

Intensification has always been more or less a difficulty with gelatine plates, and many methods for the use of silver for this purpose have been published; but as long as free nitrate of silver was used little or no success was obtained.

In 1883, however, Mr. Howard Farmer introduced a process which consisted of bromide of silver dissolved in a solution of hyposulphite of soda, mixed with a strong alkaline developer and applied to the plate after fixing. This was the first real step towards success, the great advantage being that there was no necessity for the complete removal of hypo from the film.

In 1889 Mr. W. B. B. Wellington published a modification of this method, in which sulphocyanide of silver is substituted for bromide, and it is this method that I now recommend. The formula I give is a modification which I have worked out myself, and which I know to work satisfactorily:

Solution A.

Silver nitrate10	0 grains
Water	2 ounces

When the silver is quite dissolved, add 240 grains of sulphocyanide of ammonium, which should, on stirring, redissolve the precipitate first formed and give a clear solution.

Solution B.

Pyrogallic acid
Bromide of potassium
Sulphite of soda30 grains
Water (to make)1 ounce

For use take one part A to three parts of B and stir in just sufficient crushed hyposulphite of soda, to dissolve the precipitate formed, and add to each two drachms of solution, from three to five minims of strong ammonia. The mixed A and B solutions with hypo will keep at least a week and only requires the addition of a few drops of ammonia at the time of using. This intensifier may be used on wet or dry collodion plates, and is useful for lantern slides.

For collodion work, however, the solution may be used more dilute, in which case a larger quantity of hypo will be required. It must be remembered that the facility with which gelatine plates can be intensified with silver, varies very much. The softer the gelatine used in the emulsion and the smaller the proportion of gelatine to silver bromide, the more readily can it be

accomplished. The great advantages of this process over the mercury methods are:

1st. The operation can be conducted almost immediately after the plates are fixed, a slight rinse under the tap being all that is necessary.

2d. No change is made in the composition of the image.

3d. The only stain that is likely to occur, is yellowing from the pyro, which, if deemed desirable, may easily be removed by means of the ordinary acid and alum clearing solution.

4th. The intensification is accomplished by the application of a single solution and can more easily be judged; though it should be remembered that the negatives will be more dense when dry than they appear while wet.

One word of caution; should there be any surface scum of green fog on the plate, it will rapidly take the silver and should be removed beforehand. I have found it a good plan to flow the plate with a weak solution of hypo, to which a few drops of a solution of ferricyanide of potassium have been added, and thoroughly rinse off as soon as the scum has disappeared. It may be thought this process is an expensive one, but when it only requires 2 drams of solution to intensify a plate $6\frac{1}{2}x4\frac{3}{4}$ inches, and with silver at its present price, I think it can hardly be held to be so. Do not use a dish; it only causes a needless waste of silver, as the silver will be deposited on it, if it is not scrupulously clean. The solution may be flowed on and off the plate or the plate placed on a levelling stand. I have found this process useful for local intensification.

THE ELECTRIC LIGHT IN THE DARK ROOM.

By R. A. R. Bennett, B. A. (Oxon.).

Of all the worries which beset the path of the aspiring votary of photography, I think none are more exasperating than the vagaries of the ruby lamps with which he lights his dark room. I have tried all sorts of oil and candle lamps, from the very expensive brands down to the cheapest, and in every case I have been more or less disgusted with them. The candle lamps, however well they may be manufactured, will flare and smoke till the atmosphere of the dark room, if small, is nearly unbearable, and one is strongly tempted to open the door and secure a whiff of

fresh air, at whatever cost to the negative. No candle lamp which I have used, whether with springs or without, have been free from this fault. Then as to oil lamps—if they burn colza, they will smoke as much as, or more than the candle, and the smoke is, if anything, more unendurable, and these lamps are never provided with glasses, which might cause a less smoky flame. If, on the other hand, they burn paraffine oil, they will cover your hands with oil, and the smell will not leave them for hours, even if you wash them. Finally, either kind of oil will cause the ruin of anything in the way of bromide paper with which your hands may come in contact.

Now for those who have experienced these troubles, and cannot from some cause or other admit the daylight through a red window, and thus avoid the hindrances to one's work, I recommend the use of a small incandescent electric lamp with a ruby colored shade. A five candle power, six volt lamp, will be enough for a small room, and by having two, one white and the other red, and a switch to turn the battery on to either at will, the room can be instantaneously lighted by non-actinic or more serviceable white light, as wished.

The difficulty is to find a suitable battery for the work, and it is in this respect that the operator who knows little of electrical matters, needs advice. The work cannot be done by a Lechlanché battery, such as those used for ringing electric bells, for we must have a light capable of lasting for at least twenty minutes at a time, and even a powerful Lechlanché battery will only run an incandescent lamp for five minutes or so at intervals. At the same time the battery must not need continual attention, or the photographer's work will be impeded.

Well, for those who do not spend more than twenty minutes or so in their dark rooms, at intervals of an hour or two, the "chloride" battery will work well. This consists of a plate of carbon in the outer stoneware cell and an amalgamated rod of zinc in the inner porous pot. The carbon partition is filled with solution of bichromate of potash (four ounces to a quart), two parts, common hydrochloric acid, one part, and porous pot is filled with either a solution of sal ammoniac (about two ounces to eight ounces of water), and two ounces of hydrochloric acid, or a solution of chloride of zinc (two ounces to eight ounces of water).

Five cells of this battery will light the six volt lamp, and it will

very likely run for a month or six weeks if not used too often. The only inconvenience attending its use is that the amalgamated zincs dissolve rather rapidly near the top. I myself dissolve the extra pieces of zinc in dilute hydrochloric acid, thus forming fresh chloride of zinc for use in the porous pot of the battery.

If wanted to run for several hours at a time, a Bunsen's battery may be used, but it must be kept out of the house, on account of the fumes given off, wires being brought from the battery into the dark room.

The nitrate of soda battery is also a good one to work, and cheap. It gives off nitrous fumes, however, like the Bunsen, and therefore must be kept in the open air. In the outer cell, is a solution of nitrate of soda and sulphuric acid with a plate of carbon, in the inner cell is a zinc rod surrounded by one part sulphuric acid to twelve of water. This battery can be made to run the light for twelve hours consecutively, and on pouring out the solution in the inner cell and renewing it, the light may run for two or three hours more. In all these cases, however, a good deal of zinc is used up, and the battery has to be replenished at the end of the run.

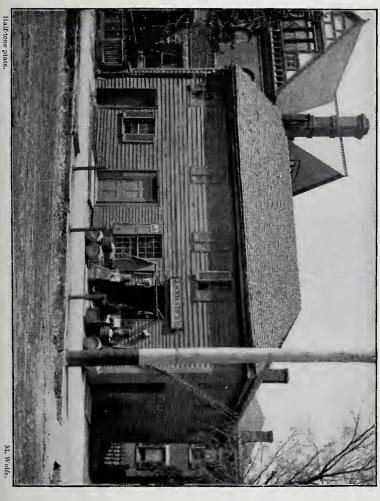
For any one who could get them charged cheaply, or had a dy name with which to charge them, accumulators would work well, as the current can be drawn out of them by little or much at a time, which cannot be done with a battery.

Finally, I would say that if any one objects to recharging the battery so frequently, and wants to use the light for some hours at a time, let him stick to the candle or oil lamp; but for those who only use their dark rooms occasionally, and for a short time at each operation, incandescent lighting with a battery offers considerable advantages, being entirely free from smoke or smell, always ready for use, and changeable from white to red, and vice versa in an instant, according to the will of the operator.

THE EYE AND THE BRAIN, THE LENS AND THE PLATE.

By C. H. Bothamley, F. I. C., F. C. S., The Yorkshire College, Leeds.

The production of pictorial effect and the correct monochromatic rendering of colored objects by photography are now very common topics of discussion among photographers, and certainly there





are no questions of greater importance from a practical point of view. Both involve subjective as well as objective phenomena; the causes and effects to be considered are partly physical and chemical, partly physiological and psychological. It seems to me that, as a rule, the subjective side is either neglected altogether, or is appreciated much below its real importance. We hear a great deal about the resemblances between the eye and a photographic lens, but very little about the important differences, and the great and essential differences between the mode of action of a photographic plate and the brain respectively, rarely receive any consideration at all. It is obvious, however, that if we are to arrive at any right conclusions, all the facts subjective and objective must be taken into account and appreciated at their proper value.

It is true, as we are so often told, that the angle of view included by the eye at any given instant is very small; that at a given instant the eye is focussed upon one plane and that only one or a few objects even in that plane are sharply defined. It is also true that the focal length of the eye alters unconsciously with great rapidity and that the eyeball can also turn very rapidly in its socket through a considerable angle, thus altering the direction of the axis of the optical system without in any way interfering with its relation to the brain. The focal length of any given lens, on the other hand, is invariable, and although the depth of focus can be altered by means of the stops, this involves at the same time a reduction of the brightness of the image. The direction of the axis of the lens also remains fixed so long as the camera is not moved. The formation of an image by a photographic lens and its projection upon the sensitive surface is a purely physical phenomenon of a fairly simple character; the formation of an image by the lens of the eye, its reception by the retina and the transmission of the effect to the brain, in other words, the process of seeing, is a very complicated chemico-physical, physiological and psychological operation. Every impression received through the eye lasts on an average for a tenth of a second, and all successive impressions which follow one another at intervals shorter than this, overlap, so to speak, and are integrated by the eye into one compound impression, without any consciousness on our part that such an integration has taken place, and that what we think we see is really a resultant of many separate and different impressions communicated successively to our eyes. The eye turns in its socket and its focal length alters in much less time than a tenth of a second, and consequently we see well defined and apparently at the same time, objects in many planes and included in a much wider angle than would be the case if the eye were rigidly fixed and its focal length were unalterable. No one with a normal eye, sober and in good health, ever sees objects with a frizziness similar to that produced by a lens which is out of focus.

The brain will carry this process of integration much further, and after we have carefully examined a landscape or other object, we have left in our mind an impression which is really a resultant of impressions received one after the other at intervals much greater than a tenth of a second. It may include objects close to our feet and objects on the horizon and may embrace an angle of view of 180° or even more. No photographic lens can produce upon one plate a compound impression of this kind. Every image thrown by the lens is quite distinct and separate from the others, and there is no integration similar to that effected by the eye and the brain. Even with a moderate angle of view, the lens becomes faulty in its rendering, because of the rapidity, in all senses, of the optical system.

A plate is a receiving apparatus very different from the retina and the brain. We observe this in a very marked manner in the different relative effects produced in the two cases by rays of different wave-lengths. Rays producing color sensations, which we call bright, such as yellow, and orange, have comparatively little effect on a plate and vice versa. Red and green rays falling simultaneously upon the eye produce the sensation of white, but if they fall on a plate each set of rays produces its own effect quite independently of the other.

Other differences might be mentioned, but these will suffice. To a certain extent the lens is analogous to the eye, and the sensitive surface to the brain; but the analogy is very far from complete, and it is essential to keep this fact constantly in mind when discussing all questions of pictorial effect and correct monocluromatic rendering of different colors.

SIMPLE METHOD OF HANGING PICTURES.

By Wm. Chanberlain, Cranford Camera Club.

After the photographer has overcome all the many little difficulties which beset his path in the making of satisfactory

pictures, the question next to be answered is, how best to arrange them for inspection by his friends; probably he has albums and scrap books, but he wishes to hang them on the walls of his rooms at home or at the club. To buy frames, is an expensive process where many are required, and again when once framed there is a disinclination to replace the picture with later ones, consequently many worthy prints are not shown to advantage. This has been my experience up to the present, when it occurred to me that the following simple plan would overcome the difficulty. A piece of ornamental brass wire was purchased for a few cents and bent to the following shape—



and a newspaper pin placed at each end to hold the picture. The picture can now be hung at a moment's notice wherever desired, no matter what the size of card used.

VARNISHES FOR LANTERN AND STEREOSCOPIC TRANSPARENCIES.

By John Haimer, England.

At a former period, dating some five and twenty years ago, when the production of small transparencies was, as now, a favorite and profitable branch of photography, much pains were bestowed on the production of varnishes and of deadening solutions in imitation of ground glass. As these were to be used on surfaces which were to be protected by a glass cover, the main qualities sought were delicacy of texture, freedom from color and the transmission of the property of cold application instead of the harder and more finely tempered surface of the messy and troublesome spirit solutions.

These properties are found in perfection in several varnishes of simple composition, easily made by any one who is capable of putting the powdered gums into a bottle and pouring liquids upon them. The materials required are: gum dammar, gum amber, common resin, methylated chloroform, rectified benzole and white wax. To convert these into varnishes, put gum dammar and rectified benzole into one bottle, powdered gum amber

and methylated chloroform up to the cork in another, common resin and chloroform till full in a third, and leave them to dissolve, occasionally shaking the first and reversing the position of the others. The amber being difficult of solution and each having more or less refuse to filter out, the plan adopted of dissolving up at hazard and subsequent dilution to suit the work in hand, is preferable to that of doing it according to set formulæ. The manufacturer cannot go wrong; he is dealing but with one gum in each case, so there is no question of so proportioning the quantities of each item as when the refined temper of a high quality of spirit varnish is required, in which case rigid adherence to an exact formula is a paramount necessity.

When dissolution is fairly complete, filter and try each upon a waste plate and dilute, if needed, till brilliancy of surface is just obtained. Collodion films require greater body than gelatinized surfaces. Each of the three give a durable varnish, the dammar and amber ones especially. All are applied cold, care being taken to ensure the film being thoroughly dry and that the temperature of the room is not lower than 60° F.

To convert the diluted chloroform samples into ground glass substitutes—add 2 or 3 grains of white wax per ounce, dissolve, filter and try a plate, observing that the room be cool and no motion given to the plate till the solvent has evaporated before tilting it up to drain. As the film of wax hardens, a most beautiful obscured surface appears, of a finer or denser description as the amount of wax added is less or exceeds the quantity given above. I may add, that for many years the secret of its manufacture was a trade one, which I believe I was the first to make known to the fraternity some twelve years ago.

Amber varnish, when chloroform was about 12 shillings a pound, was an article of commerce, and now it can be procured for a fourth of the price. I have never heard of its being used for photographic purposes, at any rate for the last twelve years. In the collodion period, varnishing twice was very common, the first layer being usually a dammar one, upon which spotting and working in color was first, the revarnishing being done with a spirit one, which had no action upon the first film. This plan has its advantages in the protection it affords to the present day negative; it is, however, seldom practiced,

THE MANIPULATION OF THICKLY COATED PLATES.

By Chapman Jones, F. I. C., F. C. S., England.

Plates thickly coated with rich emulsion have advantages which are so numerous and obvious that probably no one will be prepared to dispute their superiority. The practical ridding of halation by absorbing the light on its passage through the film, instead of attempting to deal with it after it has been allowed to get through and has begun to do mischief, is alone reason enough for preferring a thick film. But it is certain that several who have endeavoured to realize these advantages for themselves have not altogether improved their negatives. This we know in some cases, is because they have treated the thick films in the same manner as thinner ones. It is possible to imagine that sometimes an attempt has been made to carry out a strictly fair comparative test by treating variously coated plates simultaneously and alike. Such procedure is no test whatever. amout of washing will act more thoroughly on the thinly coated plate and this therefore is the most likely to retain less of the developer and to be the least stained; such a plate will also be more thoroughly fixed and hence more amenable to successful subsequent treatment, such as intensification, etc.

To realize to the full the advantages of thick films, it is necessary to fix and wash for a proportionately long time, and it is not possible to state specifically for how long. It will perhaps be somewhat of a guide to the novice, to tell him to note the time that elapses after the plate is put in the fixing bath until the last trace of visible silver bromide is dissolved out from the glass side of the film. The total time of immersion in the fixing bath may perhaps be double this and the subsequent washing perhaps ten times, with changes of water at reasonable intervals.

Other things being equal, frilling is more likely to occur with a thick than a thin film, but this trouble is now practically a matter of the past and is scarcely worth referring to. If however there is a tendency in this direction, the plate should be handled as little as possible, as contact with the warm fingers is almost certain to exaggerate the trouble.

MONUMENTING DAGUERRE.

By G. H. Loomis, Newtonville, Mass.

"Better late than never," that some suitable memorial should be erected to this one of the world's grand discoverers. We were born a sufficient time before this invention to remember well how it amazed the people.

It was for a while regarded as pure magic, almost witchcraft, and to be fully convinced otherwise, was to go and sit and see for yourself. I think I have among my collection of works by the "old masters," or "buffers," as they were not inaptly called at that time, a specimen picture of the one-sixth size, executed fortyeight years ago, when acting as rabbi in a country school. Two or three of my pet pupils help compose the group. A small table or desk, around which we stand or sit contains a school globe, our object lesson in geography.

About the time we catch on to Galileo's conception of the earth's rotundity, we are focussed, and with a "don't you wink" admonition, we severely practice still life for five or more long minutes, when we resume breathing and circulation and wipe our "weeping eyes." The effort, however, was not without its reward, for we were in due time shown one of the handsomest and most picturesque groups ever painted with a "pencil of light," allowing us, of course, the right of affirmation without being under oath.

The picture, if not the subjects, has stood the test of time wonderfully, and as we often pick up these Daguerrian productions and study their fine artistic points, we feel almost tempted to go in and boom them anew, as superior to any of the later so styled improvements in portraiture. We remember the fine specimen work of Root, Mead, Southworth & Hawes, Hale, Whipple and many others, produced in the early days of this discovery, and though by reason of the highly polished surface it was not always an easy matter to "view them in the right light," they were true to nature and the perfection of art.

Yes, let all of us who appreciate and prize this most wonderful as well as useful discovery of the century in which we live, generously "chip in" and immortalize the memory of L. J. M. Daguerre and his remarkable invention. Individually we may hold diverse opinions as to the most fitting and appropriate design of this memorial, but should it not be just the thing we would chisel out if we were sculptors, it will doubtless be respectable and serve the purpose of the donors or contributors, Again we say, let us all bear some part, more or less, in this very worthy object,

HOW I DEVELOP COLLODION EMULSION WITH EIKONOGEN.

By H. London, San Francisco.

I have no doubt that there are many others beside myself who prefer to use collodion emulsion for making "lantern slides," transparencies, etc., and it is for their benefit that I write. I feel assured if once tried, they will be pleased with the results obtained by its use. And there are other reasons why I advocate its use, among them being the following: There being only one stock solution required; several plates can be developed with one developer; the beautiful warm tones that can be obtained; no staining of fingers; it has no repellent action when applied to the plate, nor is it necessary to apply an alcoholic solution to preserved plates previous to development; the deposit is finer grained than that obtained even by iron development; the only thing that I am not certain about, is its keeping quality. So far, it is ahead of the alcoholic solution of Pyro. I have a stock solution that was made ten weeks ago and find no change in color or energy; how long it will keep remains to be seen. No doubt some will say that I am piling it on, but such has been my experience with "eikonogen" in developing collodion emulsions. I claim nothing original in the formula, as it is only a modification of Dr. Dewey's (given to me by a friend) for developing gelatine dry plates, and which I use in the following manner for collodion emulsion:

Sulphite of Soda Crys	450 grains
Carbonate of Soda	210 "
Dissolved in hot water	5 ounces
and when cool add to the above:	

Eikonogen 60 grains
The eikonogen should be finely pulverized; if not it will take too long to dissolve.

The above is what I call stock solution. In developing a lantern slide I proceed as follows: take of the

•		
Stock Solution	3 (drams
Water (tap will do)	3	66

This is the developer, and for lantern slide, take of this developer 1 dram, to which add 4 min. of a 10 grain bromide of potassium solution and proceed to develop and fix as usual.

This is my method of using eikonogen for collodion emulsion. The emulsion is an unwashed one and one that I have had no trouble in keeping; in fact it seems to improve with age, and in using it I coat a plate, wash it under the tap until the greasy lines disappear, expose, give a slight wash again, and then develop.

When I desire to use them dry, I coat, place in distilled water, and then in a coffee preservative, and dry, and as I said before I find no necessity for flowing a dried and preserved plate with an alcoholic solution before development; I simply wash it under the tap for a minute or so and then apply the developer, which in case it is a preserved plate I use as follows:

Stock Solution 2 drams
Water 4 "

Take of this 1 dram, bromide potassium 10 grain solution, 3 minims, and develop; and in case the developer shows signs of weakening, add a few drops of the above developer to it, fixing as usual.

Now, Mr. Editor, I hope that through this humble effort of mine, some one may try my method and say, as I do, eikonogen is best of all, for collodion emulsion.

PHOTOGRAPHY AND THE MAGNITUDE OF THE STARS.

By Dr. O. Lohse, Potsdam, Prussia.

The varied brightness of the stars is measured—as is known—according to classified signs, and the stars of the first magnitude are the brighest. The stars of the sixth class or size can still be seen with the naked eye, the yet higher classes only with the aid of a telescope.

This scale was based originally only upon estimations with the naked eye, without the aid of any other apparatus, and it is astonishing what certainty can be obtained in such estimations with a little practice.

This method of estimation was for a long time, the only one existing; later on, after the invention of a suitable photometer, with whose aid the relative brightness of the several stars could be actually measured, an effort was made to determine the size of a star of the first class, in comparison to that of a star of the second size, or whether a star of the sixth class was brighter

than a star of the fifth class. Thereby was shown the sensitiveness of the human eye in its ability to determine the difference between the several classes.

It was proven that a star of the first size was $2\frac{1}{2}$ times brighter than a star of the second size, just so, is a star of the fifth size, $2\frac{1}{2}$ times brighter than one of the sixth size. The brightness increases, therefore, towards the stars of the first magnitude, proportionately to the power of $2\frac{1}{2}$, so that a star of the first size is about 3,800 times brighter than a star of the tenth size.

After this definition, which precedes by reason of general explanation, I come now to the difference of the size classes relative to photography.

At the last meeting of the international permanent committee for the production of a photographic celestial chart, which meeting took place at Paris in September, 1889, it was desired to determine what length of time would be required for exposure, for stars of the eleventh size to appear upon the plate. practical proposition was thereupon made, to determine first the time of exposure for a star of the sixth size, and then based upon the above figure 21/4 to calculate the time of exposure for the stars of the eleventh size, which accordingly would be 100 times longer. Doubts were expressed, if the acceptance of the figure 21/2 was justified. This authority, indeed, is wanting. figure 21/2 is for those luminous rays for which the human eye is most sensitive, namely, for yellow. But the ordinary photographic plate is mostly sensitive for violet, and two stars, whose vellow lights are in proportion of 1 to 21/2, will have a different proportion in the brightness of the violet rays. To this has to be added, that yellow light penetrates much better the atmosphere of the earth than violet light, whereby the proportion in the photographic brightness (actinism) is also changed.

It is easily comprehensible that the size classes of the stars in photographic relation, show a greater diversity than optically, and that the difference calls for a larger figure than $2\frac{1}{2}$. The writer, some years ago, on the occasion of taking photographic views of the star group X Persei,* determined a value for the photographic diversity of the size classes, namely, 3.2. Applied to above example, the stars of the eleventh size would have to

^{*} Astron, Nachr., 1885, Vol. III., No. 2650.

be exposed 336 times longer (not 100 times) than the stars of the sixth size, and stars of the tenth size nearly 35,200 times longer than stars of the first size.

These figures show the importance of an exact determination of the proportionate figure between two size classes, if the time of exposure is to be calculated for weak stars, and further, that if for a size class, a considerable time (for instance two hours) is required that $6\frac{1}{2}$ hours of exposure are necessary to obtain the next size class. This limits pretty sharply the accomplishments of an instrument.

The determination of the size class, forms the main difficulty in producing star catalogues with the aid of photographic views. Information about the brightness has to be given in each catalogue, forming, besides the stellar position, a principal criterion by which to recognize the constellation in after years. It will not do to mention in the star catalogues only the positions of the stars, as, after the lapse of a longer period and in consequence of movements of the stars themselves, serious misunderstandings could originate difficult to explain.

Besides the measurement of the stars upon the photographic plate, an estimation of their brightness must therefore take place. A certain support for this comes from the larger or smaller diameter of the star pictures upon the photographic plate. A bright star gives a larger picture than a less bright one, and it has always been the endeavor to determine by measurement and calculation, what proportion exists between the optical class sizes and the picture size of the stars. But it is evident that the diameters of the pictures of the stars on the photographic plates depend always upon a number of accidental circumstances; for instance, the achromatism of the objective applied, the disturbance and transparency of the air, the motion of the clock work on the telescope, etc.

The measurement of the diameter of the star pictures, with regard to the determination of the size class, must therefore be considered only as a makeshift.

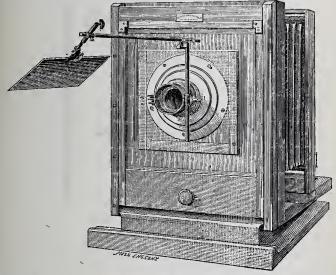
A more exact method, admitting the direct determination of the mutual proportions of brightness of the stars, for at least one and the same view, was applied years ago by the writer. It consists in making a number of views from each star by moving the photographic plate, and which obtain a certain increase of exposure. It is agreeable to the purpose to increase the exposure hereby in such a manner that a direct connection with the size classes of the stars will originate; or, in other words, that the above mentioned figure is used. If one commences, for instance, with an exposure of one second, the following number of exposures will take place:

1s., 3s., 10s., 33s., 1m. 45s., 5m. 35s., 17m. 33s., 57m. 13s., which in sum total would consume about 1½ hours. After this process we obtain from each star, according to its brightness, one to eight impressions, after which the arranging in size classes can take place.

A PHOTOGRAPHIC LENS SHADE.

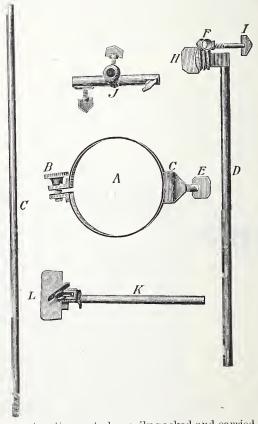
By O. G. Mason, Bellevue Hospital, N. Y. City.

The making of negatives under unfavorable conditions of light and surroundings, often requires the use of unusual means by the professional photographer who is called upon to illustrate



some scene or object at a stated time, regardless of surroundings. Illustrations of military and civic pageants, on land or water, or seen from certain points, may be and often are

required, under conditions quite the opposite from those which would be selected by an experienced and careful operator who chooses to have his work attest some knowledge of the laws of art in the production of a picture. One of the appliances often found useful to outside workers, is a lens shade, of such light and



portable construction as to be easily packed and carried, and also capable of easy adjustment, to adapt it for use under any and all conditions likely to be met in practice.

The accompanying illustrations show the construction of one which I devised about two years ago, and have since used both in

the field and for flash light work. A few short pieces of small brass tubing, wire and small screws, easily procurable in most towns at little cost, constitute all the material required. The illustration will give a better idea of the device than can be conveyed by words.

A light band (A), around the lens tube, made adjustable to various sizes and positions by the screw (B). On the opposite side of this band is a short sleeve of tubing (C), through which passes the main upright or carrying post (D), held at a chosen height or point of revolution by set screw (E). At the top of this post is a joint which allows the sleeve (F) and its carrying rod (G) to be held at any chosen angle, by clamping screw (H) and Set Screw (I). This rod (G) carries the cross sleeve (J) and its rod (K), on the end of which last named is a simple pinch clamp, L, holding the card, wood, tin or cloth, forming the shade proper, as shown in Fig. (2), which can thus be placed and held at any point above, below, or on either side of the lens. In practice, the apparatus has been found useful and quite satisfactory.

CAMPING PHOTOGRAPHY.

By R. C. Matheson, Toronto, Canada.

Having been asked to contribute to this year's ANNUAL, I think I cannot do better than give the results of my practical experience to the community of amateurs whom I hope will be able to glean something useful from what I will tell them.

Being an amateur and having abundance of time on my hands, I have been able to utilize it in expeditions, especially in the shape of camping parties, where my camera has played an important part in securing records of annual events. The first practical hint I obtained from a photographer in the Rockies, has been of great value to me, and has saved me a great deal of trouble and anxiety in changing plates when out camping. The fact is, that it is perfectly safe to change plates in the open air at night so long as the moon is not shining brightly. During May at Etobicoke, and during Angust in Muskoka, I exposed about eight dozen plates of Cramer's fifty times rapidity changing all these about ten P. M., even on bright starry nights in the open air without any covering, and when developed there was not the slightest trace of fog on any one of them.

Down at the Thousand Islands last August, I had a great experience in outdoor development, having built a temporary darkroom in my tent. The results were not satisfactory in consequence of the heat making it almost impossible to keep the films from melting and the dust, which is blown about when the plates are drying, also has a damaging effect. However, I believe that a few plates developed during an expedition, go a long way to ensure good pictures, and my method as at present in use is simple and economical. I simply take a box or two of carte plates, of the same make as those which I expose in earnest, one ebonite carte tray and a small bottle of single solution developer; that is all. Every day with a change of light or subject I expose one of these carte plates, and at night develope it. The results show if the exposures have been right for the rest of my work, and I do not trouble to fix the negative; it has served its purpose and I fling it away.

The great trouble with the amateur on an excursion, is the weight of glass plates, and the objection to films, is the expense. Coming to think of it, the price of celluloid films are out of all proportion to the cost of their manufacture as compared to glass; celluloid ought to be more cheaply produced than glass can be. Celluloid will never be popular for professional work in the studio, at least not until it is produced as rigid as glass, consequently the amateur out doors is the only customer the makers can hope for. Amateurs, as a rule, do not want to spend more than they can help, and therefore will think twice over the cost of celluloid films; it would, therefore, be better policy for the makers to set their prices more in accordance with the cost of production and abandon the attempt to use their monopolies as a medium of extortion which diminishes their turn over.

There is a great field for ameteurs in the Canadian Rocky Mountains, but it is useless to go there without the longest focus landscape lens that your camera will hold, and expect satisfactory results. You can leave your rectilinear lens at home on these excursions, for except to photograph a shanty the full size of your plate, you wont want it, and shanties look better in the middle distance where your landscape lens should be rectilinear enough.

LANTERN SLIDE PLATES.

By Professor Speneer B. Newbury, Cornell University, Ithaea, N. Y.

The writer has received so many requests for practical directions in regard to the working of his slow-emulsion formula (published in the Sc. Amer. Suppl., Feb. 12, 1887), that he embraces this opportunity to give a full account of the method which has yielded the best results. The process has now been used for over three years at the Photographic Laboratory of Cornell University; the plates are employed in making lantern slides for use in the illustration of lectures. More than fifteen-hundred slides are made every year, on homemade plates by the University photographer. Experience has shown that clearer and brighter slides can be produced on these plates, than on any of those for sale by dealers.

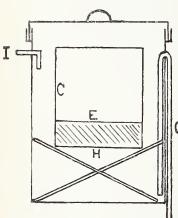
The following is an outline of the method by which the emulsion is made:

Weigh out eight grammes, (123 grains) of Nelson's No, 1 gelatine, place it in a beaker-glass, and pour over it 300 c. c. (ten fl. ounces) of distilled water; allow the gelatine to soak about ten minutes, then dissolve it by placing the beaker in hot water, stirring till dissolved, and heating as little as possible. Add from a pipette 4 c. c. (one fl. drachm) of a one per cent. solution of hydrochloric acid, (made by adding one part concentrated acid to 100 parts water). Pour the acidified gelatine solution into a quart glassstoppered bottle. By ruby light add 32.5 grammes, (500 grains) of silver nitrate, in crystals, and shake until dissolved. Then add twenty-five grammes, (386 grains) of pure, crystallized potassium bromide, (best in rather large crystals), and shake again until dissolved. This method of emulsifying yields the bromide in a remarkably fine state of division, as may be seen by the intense red color of the emulsion if a drop be placed on glass and examined by transmitted daylight. The addition of the silver before the bromide, produces no bad effect, if the gelatine solution be not alkaline.

Ten grams, (154 grains) of Simeon's hard gelatine, previously well soaked, is now drained free from excess of water, and melted in a beaker on the water bath. The emulsion is decanted into this, and the whole well mixed by stirring. The beaker with its contents is then placed in ice water, and allowed to remain two

or three hours, (or all night) to become thoroughly set. The emulsion is then removed from the glass in a solid lump, squeezed through coarse embroidery canvas, and washed several hours in running water.

Our washing apparatus is so extremely convenient and effective that a brief description of it may not be superfluous. It consists of a copper cylinder about fifteen inches high, provided



with a light tight cover, an inlet tube, I, and a larger siphon outlet tube, O. C is a copper cylinder nine inches high, open at both ends, and japanned inside and out. its lower end a sheet of coarse hair cloth, H, is fastened by a broad rubber band. shredded emulsion, E, is placed in the inner cylinder, resting on the hair cloth. On the admission of a gentle stream of water the vessel is gradually filled, then automatically emptied, and the emulsion is thus successively

soaked and drained many times. Three or four hours of such washing will remove all soluble salts.

The inner cylinder, with the emulsion, is then removed and placed on a thick pad of filter paper to drain. Ten grammes more of Simeon's hard gelatine, previously soaked, is then melted in a 30-ounce beaker, the washed emulsion is added, and the whole thoroughly melted and mixed. The temperature may be allowed to reach 50° c. (122° F.), with advantage to the emulsion, but should not rise higher than this .50 c. c. (one and one-third ounces) of alcohol is then stirred in, and the emulsion made up to twenty ounces by adding water, if necessary. It should be kept two or three days before coating plates.

The omission of part of the gelatine until after the washing, as directed above, is a great advantage, as it greatly lessens the bulk of material to be washed, and thus introduces less water into the emulsion.

For lantern slide work, both for plates and covers, very thin glass of fine quality is essential. The fine thin glass used by

TACOMA HOTEL, TACOMA, WASHINGTON.

Levytype Co.



French slide makers, is difficult to obtain in this country. We have, however, been able to obtain a supply of English glass of excellent quality, about one-twentieth of an inch in thickness, in 8x10 sheets, from J. Lucas & Co., 141-3 N. 4th street, Philadelphia. The 8x10 size is very advantageous, as, after removing a one-fourth inch strip from one end, it cuts just six plates of lantern slide size, $3\frac{1}{4}$ x4 inches.

The operation of coating plates is very simple when one has acquired the "knack." The emulsion is melted and filtered through a tuft of absorbent cotton into a small china tea pot. The plate is placed level, resting on three screw-eyes; the emulsion is poured on and flowed over the plate by inclining it, while the excess is poured off into a beaker, to be rewarmed and filtered, before it is used again. The coated plates are laid on a level marble slab to set, and after a few minutes are transferred to the shelves of a simple drying box, connected with a chimney by a tin pipe. The draught thus secured is sufficient to dry the plates perfectly in twenty-four hours or less.

Plates made as above directed are very slow, which is an advantage for transparencies, as they may be developed in a bright red light. The most striking peculiarity they show, is however, their wonderful fineness of grain, or rather total absence of grain, and the rich brown tone they will yield when developed by ferrous oxalate or hydroquinone, which is entirely different from the gray color yielded by ordinary gelatine plates. From good negatives, slides may be obtained on these plates which resemble in every respect the best albumen slides made in Paris, and are fully equal to the latter in clearness and fineness of detail. A few moments immersion in a one per cent. solution of sulphuric acid, after fixing and washing, will clear the high lights from the slight cloudiness sometimes caused by the wash water; a slight mercury and ammonia intensification adds to the brilliancy of the image and gives it a rich purple tone.

The preparation of emulsion by the above formula is an excellent introduction to the difficult study of plate-making. Failure in the preparation of an unboiled emulsion will seldom occur. If the proportion of bromide be increased to twenty-eight grammes, and the emulsion, after mixing, be allowed to stand in boiling water for one-half hour, with frequent stirring, a high degree of sensitiveness will result. The production of rapid plates of uniform quality is, however, a difficult matter, requiring a large amount of patient practice,

AMATEUR PHOTOGRAPHY, PAST, PRESENT AND FUTURE.

By Henry J. Newton, New York.

There is a philosophical theorem which says, that whatever has a beginning must have an end;—that whatever comes into existence, travels on an ascending grade until it reaches the way stations, perfection and maturity, where it makes a short journey across this elevated plateau and then commences a descending grade, which is continued until about the level of the starting is reached, when voluntary motion comes to an end. The fires are out, the wheels are still, silence reigns where all had been motion and life. Nature's destroying angels now take possession and proceed to dissipate and scatter without reference to beauty or deformity, that which she has spent years of labor to produce and perfect.

According to the title of this article, it might, in the minds of some, be thought incumbent on me, in dealing with the future of amateur photography, to go to the end and illustrate this philosophy, by applying it to the last amateur of our scientific art. I shall ask to be excused from this specific part of the programme, for the fact is, I don't quite see how I can command the time, and furthermore my quadrant is not adjusted for making correct comparative observations of this kind. I would however suggest in this connection, that it is not impossible that the last man who lives on this planet will be an amateur photographer, and I can, with a moderate use of prophetic vision, picture him and his surroundings far away in the dim future.

In peering into the vast abyss of ages upon ages unborn, I see our planet old and worn, illustrating the truth of the philosophy first promulgated. It is nearing its end; the sun is dim, its fires are low; its weak red light affords little support for either animal or vegetable life;—the ice from the Frigid Zone has for ages gradually encroached upon the Temperate and Torrid Zones, until there is only a narrow belt left at the equator where life is manifest either in vegetable or animal form. Here is where we shall find the last man, and I picture him with his tripod, camera and box of gelatine dry plates. The cases which contain them look ancient and dilapidated. The manufacturers name I cannot decipher, but the letters strongly resemble oriental characters.

The man seems old and weak; he moves slowly and with un-

steady tread, but finally stops under a frostbitten banana tree which is shriveled and small; the half grown fruit is dead, as are the leaves, having been killed by the heavy frost. Under this tree he stops and sets up his tripod, then wrapping about him his old, tattered blankets, lies down and sleeps the sleep that knows no waking. His tripod and camera, stand like a grim skeleton sentinel keeping silent watch over what is left of the last man and last amateur photographer. Here we will leave him in the eternal embrace of the Frost King as the centuries come and go. The light of the sun is slowly but surely going out and a chill twilight is over all at midday.

The phantom waltz of the aurora borealis, like flitting spectres, can be seen at all times of day pursuing each other like mystic torches of brilliant colored light.

At last the flight of the old earth through the heavens is becoming unsteady, as the dying sun is gathering its dead children back into its bosom, and with one wild rush, it plunges and is engulfed in the abyss.

Perhaps I should apologize for beginning at the wrong end of my paper, but this picture came above my mental horizon and so I penned it down as the panorama passed along.

Amateur photography began in the city of Paris soon after the French government purchased and gave to the world the secrets of Daguerre and Niepce. For some time the excitement, caused by publishing the fact that solar light could be used to create on chemically prepared plates, accurate pictures of any accessible building or landscape, ran high and every body wanted to try it. The amateur epidemic, in consequence of the simultaneous publication of the experiments of Fox Talbot in England, caused it however, to develop there in a greatly modified form.

The excitement produced by the first presentation of these facts to the public was transient and soon became an old and uninteresting story, enlivened occasionally by some contribution to its literature and improvement in manipulation. It went on in this way until 1851, when, by the genius of Mr. Scott Archer, a great revolution took place in photographic methods.

By him, a system was discovered and introduced, which has pointed the way and led to all that has since followed and made photography not only one of the most wonderful, but one of the most useful, of the three great discoveries of the nineteenth century.

To Mr. Archer we are indebted for the collodion process. presume there are infant amateurs of to-day, who, without consulting some modern encyclopedia, would not know what that might mean. From the date of the promulgation of Archer's process, no party has played so important and conspicuous a part in the progress of photography as the amateur, not only in its field of research and discovery, but also as contributors to its literature. The amateur of to-day means an entirely different thing from what it meant twelve or fifteen years ago. amateur prided himself on being thoroughly posted in all that pertains to the chemistry of the subject: He knew how to make his pyroxaline, his collodion, the nitrate of silver negative bath, the nitrate of silver bath for sensitizing albumen paper, how to make albumen paper, sensitize, print, tone and fix it, how to expel the demon from his negative bath when he invaded his dark room, which he was sure to do sooner or later, and how to make developers with which to develop his exposed plates; all of these and a multitude of other things, the amateur of the past prided himself on fully understanding and knowing by experience and observation.

Contrasted with the average amateur of to-day, there appears so great a difference that the question naturally arises whether we fully understand what is meant by the term "amateur photographer." In these times a person may successfully lay claim to the title, who comes in possession of what is technically called an "outfit" (which term may mean something very good or quite the reverse) then a box of plates, expose some of these in his camera; this is all that is required of anyone at the present time to earn the title of "amateur photographer." He takes his exposed plates to a professional photographer who developes them, makes the prints which are delivered to the amateur for a consideration, and he exhibits them to his friends and acquaintances as his work.

These people clan together, organize societies and hold meetings, with and for purposes as varied, as are the members composing such organizations.

The question regarding the future of the amateur can only be rationally answered by what we know of the past and present. There never has been a time, when there were as many amateur photographers as at present, or a time when the interest in the subject of photography was as general and wide spread, and judging

from appearances, we predict this condition will largely increase before it will diminish. I will point out some of the agencies at work to produce this. One of the conspicuous peculiarities innate in the mental constitution of average humanity, is to be attracted by something wonderful and strange. There is a resistless fascination in the weird and wonderful. This fact and the facilities at hand by which this inate and resistless inclination can be gratified, is undoubtedly the reason why the ranks of the amateur are always supplied with new recruits. What can there be more strange or wonderful than the development of an exposed plate? The amateur handles such a plate with a certain degree of sentimental respect which it would be impossible for him to feel toward one unexposed. When he takes it from the holder in the dark room and looks at its creamy, white surface, the thought steals resistlessly over him that within and beneath that pearly sheet, there is an invisible, spectral image, waiting to come forth as soon as he applies the magic wand contained in the developer. It is applied and on tip-toe with expectation he watches for the first rift in the winding sheet of the spectral image. A black line or spot is the first signal which reveals the fact that the effort has commenced, which will emancipate it from bondage; he watches fold after fold of the winding sheet disappear in the darkness that displaces the light, and follows the process with anxious solicitude until the completion of the work.

If all has gone well, if the exposure and developer have been exactly adapted to each other, and a perfect visible image has come out of the invisible, he will have a peculiar feeling of satisfaction and will realize that he has been brought into very intimate relations with nature; that she is not as cold and indifferent as he had supposed, for by intelligent labor he has earned from her a key by which to unlock her secret chambers. The idler and drone, secures no jewels from nature's great storehouse. Persistent and intelligent efforts are imperative conditions which nature alone rewards.

This realization of intimate relations with nature is a very healthy mental exercise and condition. All great scientists, with scarcely an exception, have been thoroughly good, if judged by what they knew and did, and not by what they believed and did not do. No missionary who has labored a lifetime for the good of his kind has accomplished as much as has the camera and

tripod. Look at the great army of young men in every country on the civilized globe who have followed this alluring, beckoning light and in doing so, have deserted ways which lead to disaster and wreck. We must not, however, lose sight of the fact that the effect of curiosity and that which astonishes, is not perpetual.

We are always ready and wanting to be astonished, but what produces that effect to-day will not do so after we become familiar with it. As a matter of fact there is no one thing, viewed from a purely reasoning and intellectual point of view, more astonishing than another, but the effect of familiarity is to dissipate and neutralize the action and effect of sentiment. This fact is sufficient to account for the continual changes in the ranks of amateur photographic Societies. That which at first allured and attracted, ceases to arouse any interest.

To a critical observer, it will be seen that the cause which acts to produce a photographic amateur, is something equivalent to a mental fever, which, like ordinary physical fevers, has its run and will be regulated by the temperament of the individual; but the average time is between two and three years, and I think you will find that any society of amateur photographers of one hundred members, in a populous town, will, after five years, have on their list of former members, at least, a hundred who have ceased to be members, or about that proportion. The field to garner from, is abundantly large to keep the ranks full. This fever rarely assumes a chronic form; this, however, sometimes happens as in the case of the writer.

HOW TO WORK WITH COLOR SENSITIVE PLATES.

By E. Obernetter, Munich.

Although the application of color sensitive plates has become quite general, there is a great diversity in the results, as regards correctness in the color tone, or value, and also in the application of yellow glass.

A tour through the recent exhibitions, gives ample proof of this.

Most of our professional photographers possess at the present day no correct judgment about the value of the color scale upon the ordinary plate; it is by no means sufficient that yellow and red appear black upon the plate, and blue white; everything changes with the slightest color alteration. We possess, for instance, a great number of blue colors and their mixtures, which appear also dark upon the ordinary plates, that is, correctly in the corresponding tone value. Such irregularities we find nowhere more than in nature; the finest color gradations, invisible to the eye, have not only a different effect upon each other, but the illumination is to a great extent the cause of it.

A simple test is the following: Paint a sheet of white paper with lines in oil color, for instance: ultramarine, paris blue, yellow lake, chrome yellow, green vermilion, red vermilion, carmine, which are put on in different thicknesses, now and then mixed with white. If comparative views are made of such a scale, using ordinary as well as color sensitive plates under varied illuminations, as diffused daylight, direct sunlight, at noon and towards evening (when-particularly during the tallthe rays appear to the eye in deep yellow), differences will appear, to which one is not accustomed generally. This, translated into nature, explains the manifold good and bad results on the same object, even if taken at the same time of the day. The application of a yellow ray filter, helps to surmount a good many of these disagreeable occurrences. Of these filters, only three kinds enjoy a more extended application, namely a plate glass flowed with aurantia collodion, a colored liquid enclosed between two glasses, or an old iron or chrome glass, as found in old church windows. The latter glass, which is not produced any more, is for the photographer, of extreme value. For many landscape photographers, the yellow glass is a hated object, and, I might assert with reason, because the application of the same is yet very primitive.

Last year I described a kind of yellow glass—acting as a diaphragm so to speak—and this kind has proved to be of excellent effect to the present day, much better than if the yellow glass is placed in front or at some distance behind the objective.

For the photographer who is exclusively occupied with reproduction photography, this is fully satisfactory. But it is different with the landscape photographer. A picture taken with a yellow glass can be traced among a thousand, if the object was so color-rich that it required a yellow glass. A blue sky, snow capped mountains at great distances, yellow meadows in the foreground, deep blue water, etc.; all this translated into its correct tone value, with dark yellow glass gives to the eyes a wrong picture.

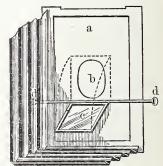
Accepted, that all the points mentioned are united in one picture, the foreground alone will be of best effect, the blue lake in the centre will be too dark, and the mountain tops in the background approach too much; on the picture they are not at a distance any more. All this is easily remedied by the following manipulation:

Add to the regular diaphragms of the landscape lens, some considerably smaller ones, to obtain a somewhat longer exposure than ordinarily, and use color sensitive plates with half exposure without yellow glass, and the rest of the time with yellow glass.

For this manipulation I have a simple rotating arrangement in

the camera, as shown by the following figure: a, lens board; b, objective opening; c, yellow glass; d, screws to open the tin frame.

For a yellow glass I have used in this case a celluloid film, stretched on a tin frame and flowed with aurantia. Glass cannot be applied here, on account of probable blurring, and the frame has always to be pushed upward as second exposure. This application has several advantages, admitting a partial il-



lumination with yellow glass of a larger plate, principally for distant views, for a bad slanting position, even for views towards the light. The most diversified effects can be had herewith, and there will hardly be a picture in nature that can not be taken by application of such a yellow glass. The film should be as thin as possible and of even light yellow coloration. Opportunity to study the effects of German color plates, made after Vogel-Obernetter's formula, is now offered, as the publishers of the Annual are now making these plates. Excellent pictures representing sunset can be made with color plates and suitable green yellow glass; but this, process is of greatest advantage in panoramas.

It would give me pleasure to hear the opinion of those who may experiment with this, and I am always ready to give further information.

COMPOSITE PHOTOGRAPHS.

By W. E. Partridge, Passaic, N. J.

Upon the production of the first composite photographs, it was expected that much valuable information might be obtained from them. This was certainly reasonable. There was a new branch of photography upon which to expend enthusiasm with the prospect of rich results to follow. Those who have looked on have seen the enthusiasm expended. The rich results are conspicuously lacking. Literature has had a new plot added to its very limited list. The young man for the first time in history falls in love simultaneously with thirty young ladies and with no one of them in particular. Our magazines have been graced with engravings of composite photos made from college classes of "twenty-seven young ladies" or "thirty sweet girl graduates" in which the best photographic complexion evidently dominated the whole. The pictures were curious, sometimes pretty and as utterly valueless as any other prints from negatives that had had double exposures. But they were neither art nor science. They belonged nowhere. They might have been worshipped without actually breaking the letter of the law.

Both artists and scientific men should find the composite photograph deeply interesting and very valuable. Probably the scientific men are disgusted, and the artists—well, they looked and laughed and forgot all about the fuzzy faces that suggested nothing except a pastry head that had been boiled too long and was in the last stages of dissolution.

Composite photography has been an utter failure artistically as well as scientifically, and yet it is the one branch which most nearly approaches art. It has seemed a simple thing to make a composite photo from half a dozen negatives of young girls, or the same number of theives from the rogues' gallery. But such a proceeding is as senseless as a child's attempting to illustrate chemical affinity by dissolving salt in a cup of water and then adding sugar and soda, chocolate and butter.

The skill of great artists, whether they work with pencil or pen, is in nothing so much shown as in sketching types. Any author is able to describe the man before him. Almost any artist can make a portrait of the individual who sits for him. But be the portrait never so faithful, if it be not a type, nobody will recognize it. The general comment will be, he made a study of what

inscribed within it. What applies to a square, applies to any other rectangle. Therefore if a lens will cover a plate when the swing back is square, it will cover it still more readily when it is inclined. Whether this fact is not generally known, or for some other reason, we find one prominent American manufacturer making a lens capable of covering an 8x10 plate, and calling it only a 61/3 x81/3 lens. This seems the more singular, as by so doing he loses a great part of the only advantage ever claimed for a lens of this sort, that of taking in a large field of view, one will find a wide angle lens advertised as embracing an angle of fully 100 degrees. This expression to say the least, is misleading. I doubt if such a lens was ever made, or ever could be made. I measured the diameter of the circular field covered by a lens so advertised the other day, and it was just 83.0°. It is doubtful if a view has ever been taken with a wide angle lens, covering a plate having the same shape as an 8x10, which measured as much as 75° along the horizon. In selecting a wide angle lens therefore, one should test it with the plate square and the sliding front in the central position, to see if it completely covers the corners with the smallest stop. If so, we may be sure that it will cover the plate in any other position no matter how much it may be inclined. We thus see that while the sliding front used alone diminishes the covering power of a lens, the swing back increases it. But this we shall find is only true when the sliding front is used as an auxiliary.

The proper use of the sliding front may be perhaps best illustrated by Fig. 3. When the plate A C is rotated to the position A' C' it will be seen that A' falls outside of the cone of rays. To remedy this, raise the sliding front and draw out the lens to the position L'. The plate will then be completely covered, but the quality of the definition at C' will be necessarily reduced. Practically the photographer's order of proceedings should be as follows:—

(a) Focus roughly with the swing back square, the sliding front in the central position, and the camera tipped so as to readily include the object upon the plate. (b) Adjust the swing back so that the plate shall be vertical. (c) In case either the upper or lower corners are not covered, adjust the sliding front so that they shall be covered and no more. The further the sliding-front is moved beyond that point, the worse the definition will become in the opposite corners. (d) Finally, focus the plate,

When we attempt to use a lens outside its natural field of view we must expect to lose something in the definition, but by following this plan we shall lose less for the extent of field covered, than by any other method.

THE FINANCIAL DRIFT IN PHOTOGRAPHY.

By W. H. Potter, Indianapolis, Indiana.

To the financial policy of photographers two ways are still possible, but it is highly probable that the near future will settle which one, to the exclusion of the other, shall become the main channel of the business momentum; for undoubtedly we are now at the dividing of the way, and in an advanced state of unstable equilibrium, and hence will soon be forced into one direction or the other.

First then, let us glance at the course least likely, from supposed jarring interests arising out of inherent selfishness, to be taken, and then at the one most likely to prevail, because combining all the higher elements of industrial growth, as developed or developing in modern commercial life.

The first plan is that of the guild—the co-operative or mutual aid and protective plan. This is not so much needed now, as in the middle ages, to protect us from the encroachment of outsiders, as to fortify ourselves against ourselves.

Let every town of two or more galleries, organize a guild, representing proprietors and employés, apprentices and dealers, on an equal footing. By delegation from local guilds, establish district guilds, in which shall be included all geographically competing cities, including towns of but one gallery. The district guild to appoint delegates to the national guild. More strictly, it should be called "The Photographer's Commercial Club," for its functions ought to be not utopian, but utilitarian, a commercially harmonized egotism and ultruism.

This plan is in strict accordance with the genius of our political institutions, as our national constitution was founded on, and our polity established and is continued, by delegations substantially representing all classes of people, of all sections of the country.

The many initialed organization lately started, smacks of oligarchy—the few making the laws and regulations, which the many

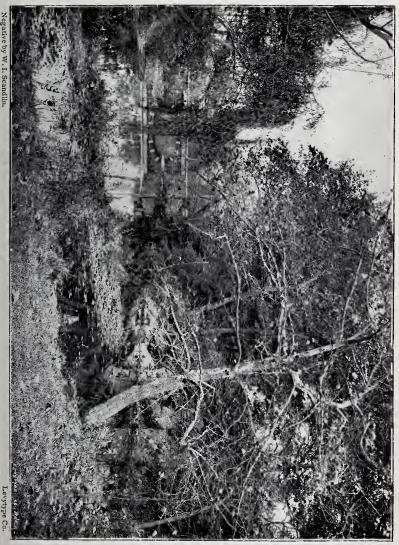
must bend to. Man is not made for institutions, but institutions for man. Hence, the plan here proposed, is the one most natural and ethical, being based on the individual, whose equality is thereby implicitly recognized, and whose title to brotherhood and humanity expressly granted, the moment such a plan becomes a fact. Then we would have fellowship instead of rivalry, mutual aid and instruction, instead of mutual obstruction or antagonism, called competition.

Now while the spirit of the dominant commercialism, seems utterly opposed to this unison of egotism and ultruism, rather tending continually to immense ebullitions of the former and feeble pulsations of the latter, yet as sure as the precession of the equinoxes shall be the realization of the sublime idealism of the sages of the ages; "The parliament of man, the federation of the world," the one supreme event to the race. For, as true as unity in nature, as all laws centre in a wise intelligence, so true, the law of conduct is as inexorable as the law of gravitation; and it also exacts apportionate penalty for all kinds and degrees of violations thereof. To this court of absolute economic equity, the final court of appeals in all conduct, we are all subject, and therefore, whether through ignorance or willfulness, and consequent selfishness, we transgress its laws, we make payment in privation and limitation, groans and sweat, blood and tears.

This brings us to the second plan—the course that embodies the tendencies of the times. It's the physical method, "the survival of the fittest," the big fishes gulping the little ones, the lamb in the lion, the large establishment engulfing the small ones. Personified selfishness delighting in monopolies, pools, syndicates, rings, and hating co-operation and everything without the lion and tiger in it. All this is made possible by the overweening vanity and selfishness of the extremely prosperous, and the distrust and inertia of those chiefly to be benefited—the struggling majority.

But let us scan more critically this voluptuous commercialism, for perhaps it is the Wilderness of Sin by which we may reach the Promised Land—or rather our children, as we are likely, as of old, to fall by the way.

Capital, both home and foreign, is becoming exceedingly abundant, and is seeking in all directions for safe and permanent investment, and is compelled to be satisfied with more and more moderate returns. Lately, in the form of syndicates, it has be-





gun to seek the field of the staple industries, for the purpose of control and profits. This is the present drift, and it is the nature of such movements to continue to develop and extend to the point of complete absorption.

To leave the general for the specific. In our profession, there is probably more than a sufficiency of talent, science and art for its scope, but undoubtedly a great lack of capital and business tact, necessary to widen the scope to its legitimate limits, which include everything in connection with portraiture, from its inception to the framing and delivery of the product, and also commercial photography in extensio, certainly more legitimate than the general store springing up all over the land.

This demand for a combination of capital, skill and business management in photography, will soon become a reality, and then the small proprietor with but little capital and less skill, like the little shop and small store, will have to give way to the great establishments. For such institutions will be enabled to produce a quality of work at such low prices and safe margin of profit, as to be utterly beyond the limited proprietor with his relatively greater expense, to amount and quality of production.

In fact, even now the tide is set in this direction, and without a revolution in the present commercial methods—some plan of co-operation to stem it—the present financial drift will soon sweep all other methods before it, and the current become too swift to be diverted by any ordinary human methods.

And already in our larger cities, want and destitution are invading our lower ranks. The tendency of our times is to a still more extended and chronic state of privation and limitation in the ranks of "the unfit." "Pity 'tis, 'tis true," yet many will say "the battle is on, and we can't help it," and "all's well that ends well." Nevertheless, we cannot thus shift our responsibility, for, whether we like it or not, we are our brother's keeper. Notwithstanding the Declaration of Independence, yea, in spite of it, men are not born free and equal in the sense they ought to be to achieve happiness, and the crime rests with, or on society.

"The destruction of the poor is their poverty"—financial, physical and mental. From a defective and unnatural environment, they don't have a chance to achieve anything but ignorance and brutality.

When this great nation shall see to it, that every child, for three successive generations, shall be properly housed, clothed, and fed, and highly educated in body, mind and the pursuit of a career, then will all men be born free and equal, and be equipped for the pursuit of happiness, and then will arise a more varied and far nobler diversity of talent, genius and pursuit, than hitherto known in the world.

Evil is the occasion for good.

ON REVERSING NEGATIVES.

By T. C. Roche, New York.

There has been of late some controversy in the photo journals as to the proper mode of doing this. Some years ago, where the work required to be done was of a small size, after the plate had been sensitized in the silver bath, it was cleaned off on the back with Joseph paper, as any marks thereon would show on the surface of the negative. The plate was then placed in the holder, the uncoated side next the lens, and a plain glass of the same size, with some small pieces of wax on the four corners, placed over the film to protect it from injury, and the exposure made in about the usual time. This plan gave very good results, but required to be specially focussed so as to allow for different thicknesses in each glass, or by judging how far to alter the position of the holder. Others made the negatives in the ordinary way, and before they dried, flowed over them (on a leveling stand) a thick solution of gelatine with a small quantity of glycerine added. Negatives so coated, had to remain for one or two days to dry before use. There is now manufactured for this purpose, a stripping film in large sheets-it consists of gelatine, water, glycerine and a trace of alum or bichromate of potash in it. Ground plate glass is leveled and coated with this solution; when dry, it very easily detaches from the glass which has been previously waxed. To use, you soak well your negative in a dish of water; then cut your stripping film at least half inch smaller and lay on the negative, the ground or dull side up; after soaking a short time, lift both out on to a table, then place a thin rubber cloth over and squeegee down lightly. When dry, cut around the edge of film and peel off. These films work well also on gelatine dry plates made for stripping. Prisms, or silver on glass reflectors, are not in general use by the professional photographer, still there are a few who use them. Mostly all those who are engaged in photo relief work, photo zinc etching, etc., all over the United States use a different process from any of the above. Their work consists of the finest lines or dots, and must be absolutely sharp. They all without question prefer the good old collodion process, pure and simple, for quick printing, fineness of deposit, brilliancy, and obtaining any density required.

After the negative has been fixed and intensified, it is next dried, then coated with a thick solution of rubber dissolved in pure benzine, then dried and coated with thick, plain collodien which contains a trace of castor oil. After this dries, which takes but a few minutes, cut the film around the picture with a sharp knife, and place the plate in a dish of water containing some acetic acid until you find the film can be loosened easily. Now wash off the acid water, and, by gently lifting the film, it can be turned over and squeegeed out flat, then dried, and is ready for printing. In professional hands, the above can be done successfully in less than ten minutes. After printing from such negatives, they can be stripped again and put away between cardboard for future use, if required, or transferred to your silver waste. One caution—don't albumenize the glass. No waxing is required. An edging of albumen will do no harm.

WHERE TO SPEND A HOLIDAY WITH A CAMERA.

By G. W. Valentine, Southampton, England.

One of the most delightful places to spend a holiday, a fortnight at least in early Summer, till the shedding of the Autumn leaves, for one who is seeking quietude and rest, either with or without the camera, that place is the New Forest in Hampshire. One may travel miles and frequently all day, without meeting a single person. But, alas! I am afraid this delightful spot is not destined to remain quiet much longer, for since the time when Sir William Harcourt built a large mansion on Castle Mallwood Hill, on the old site keeper's house, and one giving some of the finest views in the forest (the Needles in the Isle of Wight are plainly visible on a clear day), I am sorry to say since then there have been several imitators

who, I perceive, are not content with a reasonable piece of ground for a garden, but must needs take in a whole enclosure consisting of a great number of acres, shutting the British public out of what is rightly and legally their own. Rhinefield Nursery, with some very fine, healthy and exceedingly tall poplars, adjoining a picturesque and untenanted keeper's lodge situated on some high, rising ground. These poplars have been for very many years one of the chief landmarks of the forest. In doing my usual ramble one day this Spring, what should I behold with dismay, but the keeper's lodge, all the cultivated trees (including all the poplars but one) had disappeared, and stone, bricks and mortar there in their place. A very large stone mansion, covering several acres, is being erected, costing about £20,000 or £30,-000. However, this is by way of parenthesis. Several extremely interesting pictures are to be found in various parts of the A number are to be found located not far from Lyndhurst Village, at a place called Bank, and Emery Down, Queen's Bower, near Brockenhurst. A very large oak tree at Knightwood, and Mark Ash (hilly) and Bolderwood. Deer are to be found at all these places, notably at Bolderwood, where in the keeper's hut they use the deer skins for mats and the horns for ornaments. The deer are at times shy, but are to be caught by the aid of the detective camera. Plenty of hotels are to be found at Brockenhurst, Lyndhurst, Ringwood, Fordingbridge and other places. But I must not recommend any one attempting to explore the forest alone, by himself, for he would most surely lose himself, there being no one to direct him if he lost his way. Several nice views are to be found between Lyndhurst and Christchurch. Fine views are at times to be had from Holmsley and Burley. If any worn out photographer is on the lookout for fresh fields and pastures new, I most unhesitatingly recommend the New Forest to his notice—a spot in Autumn especially, that is second to none.

"AN OLD LANDMARK."

By M. Wolfe, Dayton, Ohio.

DESCRIPTION OF ILLUSTRATION FROM HALF TONE PROCESS WITH FINE LINE SCREEN PLATE.

It is certainly unusual in a city the size of Dayton, O., and almost in its very heart, to find one of the original landmarks,

as here illustrated, built 1798-99, on the site it now occupies, southwest corner Main and Monument avenue. This building is of hewn logs now covered with weather boards, though the logs are as sound as when cut ninety years ago.

Lime was probably made for the first time this year, from stones gathered from the bed of the river and piled on a huge

log fire which took the place of a kiln.

"Newcom Tavern" as this building was called, was, it is supposed, the first house in Dayton that was chinked and plastered with lime mortar.

A wandering country boy on his return from the village, reported to his astonished family that "Col" Newcom was plastering his house inside with flour. Here was opened the first store; was also the first court house and jail. The first session of court was opened here on the morning of July 27th, 1803; there being no business to transact, adjourned the evening of same day.

The judge and lawyers all slept that night in one room in the tavern and rode off next morning to open court at Xenia.

Tuesday November 22d, 1803, the second session of court was held here under a tree, back of the tavern and the aid of the sheriff was necessary to disperse the people who were curiously listening to both the testimony of witnesses and the professedly secret deliberations of the jury. Owing to the scarcity of money, persons convicted by the court, were often fined a number of deer or other skins or a certain amount of corn or pork. One man's fine was a barrow pig. Nearly all minor offenders were sentenced to punishment by the lash, from one to thirty-nine (39) lashes, on the bare back "well laid on." The sentence was generally executed at once by the sheriff. This building, now used as a grocery store and dwelling, is certainly a great contrast to the elegant residences on either side, and must soon give way to the march of improvement.

RETOUCHING.

By J. M. Appleton, President Photographers' Association of America.

"To touch, or not to touch?—that is the question. Whether 'tis nobler in the mind to suffer' the stings and smarts of art

You must dispossess yourself of the thought that you are working on a hard, gelatine film on a still harder glass plate, and imbue your mind with the feeling that you are modeling and working on the real face and handle your pencil accordingly, and you will be surprised at the difference in your "touch." Then you will begin to work tenderly and model each little form in the face with care and in its proper relation to the whole.

Second.—You must learn to distinguish between forms in the face and discolorations of the skin—or the idiosyncracies of the chemical plate—preserving the former while you make up for the latter. You must learn to know whether shadows are too violent for harmony, and if so, soften and model them, do not destroy. You must know if the lights need strengthening in order to heighten the effect, and if so, do it, but always, whether it be lights or shadows, preserve form and individuality.

Third.—You must learn to not abuse the power in your hands; so many retouchers (?) seem to lose sight of the fact that all pictures are simply a combination of lights and shadows, each with its special meaning and each playing an important part in the drawing of the face; so for that reason should be jealously guarded. Many faces are there whose individuality consists almost solely of expression—the features themselves being commonplace—which is sometimes so delicately written that a touch only, is necessary to efface them, but which are of infinite value, and convey to our loved ones the thoughts, hopes, aspirations, in fact a revelation of the inner life. Therefore the greatest care should be exercised that we do not remove from the negative the very life of the portrait.

The prevailing mistake is to overdo, and certainly shows bad taste. To know when a negative has had enough, is a very valuable point to learn.

The use of too much light and working too close to the negative, results in overwork; the size of the head should always govern the distance. Our aim, then, should be to study the various moods of human nature, and how expressed in the face. Study facial drawing so as to more fully understand the meaning of the lights and shadows which represent it, and make application of the knowledge so acquired, to the art of retouching negatives, and the result will be portraits with the impress of a soul stamped upon them, and not the cold, stony, lifeless effects, so common to-day.

Fourth.—You must learn to exercise patience, for you will find this no easy task, especially in the beginning, but one negative well done, if it take a day, or week, will be a victory. Let us learn, then, by patience.

Proficiency will come by practice, each one being easier, and so by constant training of mind, eye and hand it becomes a part of you. Then every "touch" of your pencil will meet with the response you so much desire, and the results will be such as will afford pleasure both to yourself and the customer; and the skill acquired by this sort of training will enable you to complete in the negative, the conception of the man at the camera.

When our retouchers shall have arrived at such a degree of excellence, may we hope for portraits that will need no argument, but will assert themselves and command the recognition and remuneration that are due them.

Complaints are many and protestations loud, against low prices; but come now, honestly, don't you think we are getting for our work about all it is worth?

Make work that will be in demand and who shall name the price?

But says one, "people won't have the work unless it is worked to death."

We are aware of the morbid taste of the public; but may I ask who has been feeding the public taste? It is constant abuse that depraves the appetite. Has not the public been surfeited with the false, that which tends to deprave?

The leaving of character in a portrait does not nccessarily mean crudeness; work your negatives with the *true* artistic feeling and see if they will not go. "The human face divine" is surely a study, with all of its delicate forms and features and play of lights and shadows, giving expression to the soul within, and when the operator by his skill has succeeded to a fair degree in calling this out and fixing it on the plate, the care of the retoucher should be to preserve it.

Therefore a negative should never be touched until it has been carefully studied for its characteristics. While we do not underrate the value of "idealism" in portraits, yet we insist on a fair share of the "realistic." Careful retouching is also equally valuable in *genré* work, for expression aids greatly in telling the story.

We call to mind now some of our leading men, who, when

making pictures of special import, are compelled to do their own retouching in order to preserve the story intact. May this be a *Spur*.

This, then, is what is to be learned; is what retouching means; is where the "art" comes in; such as speaks its worth every time and cannot be mistaken; so the sooner we get to it, the better. Our beautiful art demands it, and—well, yes—the public demands it. Shall they have it?

PRINTING IN CLOUDS: A NEW DODGE.

By R. A. R. Bennett, B. A. (Oxon.).

The following method of printing in clouds, to landscapes, was communicated to me by a photographic acquaintance, and as it may be new to many readers and works well in practice, I have thought it worthy of note in the Annual.

The chief peculiarity of the method consists in printing in the clouds before the landscape, instead of the reverse, which is nearly always the plan adopted by the amateur. This has the especial advantage, that the clouds can be thereby brought right down to the horizon, instead of there appearing a white line above the landscape, which, in nine cases out of ten, occurs when the printing is done by the latter method. The clouds also have an appearance of being behind the view, which gives a more natural effect to the whole picture.

A print can be sacrificed and the horizon line carefully cut out, omitting small dark objects standing out against the sky, which will not interfere with the clouds when printed over them, and the landscape portion used as a mask. Or, if it is considered objectionable to waste a print, a piece of tissue paper can be cut to the size of the negative and then, the horizon line having been traced with a sharp pencil, holding negative and tissue paper up to the light, a mask is cut out of the thin paper. By placing this on a piece of card and passing a pencil around the edge, the card can now be cut to the same shape. This mask is now to be placed over the part of the paper which will be occupied by the landscape when it is printed on, to shield it while the clouds are printed in. This is best done by using a printing frame, a size larger than the cloud negative, and having placed negative and paper in the frame, which must have a plate glass front, the

mask is then fixed outside the glass, to shade as much of the print as corresponds to the landscape portion. It can be fixed in position by being fastened to a long piece of card going across the frame, which can be fastened at any required height, with drawing pins inserted into the wood of the frame.

A number of masks may be kept, one for each negative on which a sky is to be printed, and each mask should be numbered to correspond with the negative to which it belongs.

The clouds must not be printed very deep. It is sometimes difficult to know when you have gone far enough, as, the paper being blank, there is nothing to compare them with. This difficulty is, however, nothing by the side of the difficulties to be encountered by the old process, such as trying to mould a cloth into the shape of the landscape, which cloth is certain not to take the shape required and, even it does so, a puff of wind is liable to disarrange it at any moment.

Another idea is to cover the landscape portion of a print with paint, such as burnt sienna, mixed rather thick, to form an opaque eovering, this can be laid on with great accuracy with a small brush. When dry, the clouds are printed in as usual, and then the landscape is brought back to the vision once more, by a plentiful application of cold water, which speedily removes the paint. Of eourse this is done before the washing which precedes toning, or the other prints may be affected by the color dissolved in the water of the washer in which these prints are placed.

INJURY TO NEGATIVES FROM PLATINUM PAPER.

By George A. Carruthers, Cheshire, England.

Whilst our old if not too trustworthy friend silver, has been compelled to go below the salt, its formidable rival platinum being exalted to a top seat, it behoves the thinking photographer not to be led away by its popularity, and blindly swear by it without due discrimination into its merits pro and con.

Silver printing for exhibition purposes, is now practically nil, but it is likely to hold its own for professional portraiture, and the various and odd requirements of the amateur—of amateurs even who are extensive users of platinum. The electric light threatened to put all lesser luminaries in the shade, yet gas companies, and even candle manufacturers, still manage to eke out an existance. The moral applies to the subject in hand.

The result of using damp silver paper on our negatives is too well known to need description here, the stains therefrom however can be removed by the sulphocyanide and nitric acid bath, or any of the recognized formulæ. It is to consider the injurious effects that may arise to the unwary whilst using platinum, with which the present short article has to deal.

An instance of the writer's experience may be somewhat apropos. In cleaning out a calcium tube preparatory to refilling, a piece of forgotten unused paper was discovered; not wishing to throw it away, it was placed in contact with a negative of much larger size than itself, to secure a favorite bit from the centre. The moment not being suitable to print, it was put away in a dark press and forgotten for a week. On opening the frame it was with some considerable disgust that that part of the negative in contact with the paper, was found reduced some fifty per cent., whilst the remainder was intact. Never having had a similar experience, some experiments were tried, when it was found that the cause of the instance in question, was the paper having got more or less damp whilst in the tube, the calcium of which was wet, thereby exciting into action the reducing properties of the chemicals with which it is coated. Time has not permitted trying the experiment whether paper kept perfectly dry, during a very prolonged period in contact, would have a deleterious effect on the negative. It is a matter worth investigation, though a somewhat difficult factor in the case, would be the readiness with which the paper will absorb moisture when once away from the tube.

It was recently pointed out in one of the journals, how paper spoiled through getting damp, could be utilized for "printing out," by giving a very long exposure to strong light, when no oxalate bath is necessary, fixing only being required in the usual acid solution. As an experiment, no harm can accrue from giving it a trial, only when doing so, don't use your pet negatives, especially if they have been intensified with mercury, as the film then seems particularly susceptible to outside influences when this salt has been used, and, "oh the pity o't," how difficult it is to get printing density nowadays without intensification.

The Pizzighelli form of paper, had it enjoyed a longer lease of popularity, would have had much to answer for in the way of damaged negatives, dampness of the paper it will be remembered being essential to secure best results. The folly of placing wet

matter in contact with a hygroscopic substance like gelatine, is always open to condemnation, and how much more so when we have added to that matter, a reducing agent like the ferric oxalate in the paper, only requiring dampness to render it active.

Some will naturally exclaim in answer to all this, that to varnish the negative will overcome the difficulty at once, no matter what the condition of the paper, seeming to be under the impression that a coating of gum is as impervious, as one of, say silica; but we have it on the authority of professor V. B. Lewis that "no varnish is quite impervious to gas or liquids." This is a statement of the utmost importance to photographers, it being generally thought that when once a protective coating is applied, to, say a negative, the action of noxious matter is entirely nullified. Varnish is not homogeneous, as generally but erroneously supposed. Examination under a microscope will soon show it to be full of minute capillary tubes. The application of several coats would naturally tend to diminish the evil, each succeeding coat tending to fill up those immediately underneath it.

This is an amount of trouble that will be rarely resorted to, though for the saving of a negative that is likely to be much used it is well worth it. A single coating will be sufficient if only the ordinary two or three copies are required; but on no account should the unprotected film be used if the presence of even a soupçon of aqueous matter is suspected.

LANTERN SLIDES, ETC.

By A. R. Dresser, England.

Those who follow out what I have written about hand cameras can have no better way of showing the results they get, than by learning to make slides, as there is no way you can give as much pleasure as by showing in a magic lantern, the various places you have visited or the various negatives you take, as the resulting picture or slide is far better than any print and gives pleasure both to your friends and yourself.

The making of slides is very easy, and only wants a little patience and practice to learn, and should you not care to indulge in a lantern, can be used in various ways to show off your pictures.

One good way is to buy a lanternscope—sold by Tylar, of Birmingham—one of which I have, and find it of great value, and

I would not be without one now on any account, as when any friend comes to see me I have only to pull out a drawer or so, full of slides and give them to him with my lanternscope and he can amuse himself for any length of time. This instrument has only one fault, which I hope will be got over some day, and that is, you have only one eye piece or glass to look through, and when they can make one where you can look at your slide with both eyes, it will be perfect.

Another good way to show your slides, is to have frames made to fit the various windows in your house, each frame to hold twenty or thirty slides, you can then put your slides in these frames when not required for the lantern, and they make a very nice ornament; besides this, there are many other ways of displaying them, and so you can see that a slide is not alone available for the lantern.

Now, having given a few hints as to the various ways of showing off your slides, I will try to give a few instructions as to the making of them. First, as to the way to make them, there being two ways—(1) by contact, and (2) by copying through the camera—of course when using negatives 1/4 plate size or 31/4 x 31/4, you can make slides by contact, but when using 1/2 plate or larger, you must copy through the camera or you lose all the best parts of your negative, as one does not take large negatives just to use the centre out of them. To those who go in for making slides by contact, I think the best plates they can use are the chloride or some plate that is very slow, so as to have plenty of latitude in exposure; of this kind of lantern plate there are plenty, perhaps the best being either Alpha or Cowan's or England's, all of these I have used and find good, but cannot speak much of this way of making slides, as I never make a slide by contact if I can help it, even when using 31/4 sized negative, as I feel sure you can get better results by copying through the camera, but whichever way you do the after work-that is, developing, etc.,—is the same.

To reduce in the camera all you require for so doing is to make a hole in your dark room facing West or North, and in this hole put a set of carriers say 8x10 down to $3\frac{1}{2}x3\frac{1}{2}$, and then you are prepared to copy any sized negative. You then take your ordinary camera and copy the negative to size required on the plate, by copying in this way you can dodge parts very easily and, besides, can print in clouds (double printing) without any trouble.

Now, I take it that we are going to make slides through the

camera. The question of exposure can only be told when one sees the negative he is going to use, and according to lens, stop, and lantern plate used. I always use one make of lantern plate, (Fry's), the same lens (a 7 inch W. A. Beck), and stop F 22, and when reducing from a fairly dense negative, on a fine day I give sixty seconds exposure, but one cannot tell others, as so much depends on the lens and negative you are using.

What developer you use, has not so much effect on the color of the resulting slide as the exposure given, and as a rule if you have given an exposure about right, all the various formulæ of developers will give the same color or about so, unless you use carb. amm., and that will with either hydroguinone or pyro, give a warm tone. As a rule I go in for black tones, and if I want a warm tone, I get it by over exposure and get the color afterwards by intensification in some form or other. As to the lantern plate you use, I fancy that all makers now sell good plates (or they would soon be out in the cold). I use Fry's because I am used to them, but I often use other makes if I find them good; the two best are, I fancy, Fry's and Manson's, and these two are mostly used by lantern slide makers. There is very little good in my going into the various details, as I have written so often to the various year books and photo papers on this subject, but will give a few good formulæ for the readers of this ANNUAL to try. For good results, I say, use hydroguinone of some formula in preference to pyro; good results can be got with pyro, but you are much more likely to get good results when using hydroquinone, as with pyro you have very little latitude in exposure, but with hydroquinone you have any amount.

A good hydroquinone formula is:

No. 1-or A.

Hydroquinone2	drms.
Metabisulph. potassium	drm.
Water10	ounces

Call this No. 1, or A, and for use for lantern slide one dram, to each ounce of water used. You can use this with any of the sodas or potashes but not with ammonia. The three following formulæ I find good, but like No. 1 the best.

No. 1.

Washing soda. sat. sol.	4 drms.
Water	4 drms.
Hydroguinone (No. 1 or A)	.1 drm.

No. 2.

Water1 ou	nce.
Hydroquinone (No. 1 or A)1 dra	am.
Carb. pot. sat. sol	am.
No. 3.	
Caustic potash	ce.
Water10 oun	ces.
For use, take	
Water1 ou	nce.
Hydroquinone (No. 1 or A)1 dr	am.
Caustic pot. (No. 3)1 dr.	am.

I find I get good results with all of these formulæ, but when using the last one, where caustic potash is used, you should not develop more than one or two plates with the same developer.

If one cares to use pyro, I find the best is to make up your pyro thus:

Pyro	$\frac{1}{2}$	ounce.
Metabisulp. pot	1/4	ounce.
Water1	0	ounces.

For use take a sat. sol. washing soda, to each ounce of which add one dram of above pyro sol. and three or four drops of a ten per cent. sol. of bromide, and with a little care in developing you will get good results, but you will never get good results with pyro if you undercxpose at all, in fact, give, when using pyro, a fair exposure, or you will be sure to get stain.

The one great point in being able to get always good results when making slides, is to always use a *clearing bath*, any will do. I find a good one is a sat. sol. alum, to every twenty ounces of which I add one-half ounce hydrochloric acid. Always after development, wash for say half an hour, then put in clearing bath for a minute or so and put back to wash. I shall end my paper with a few general hints.

- 1. Try and give the right exposure, but always be on the side of giving enough, as over exposure can be mended but under exposure can never be made to yield a good slide.
 - 2. Develop with some formula or other of hydroquinone.
 - 3. Use plenty of light as long as it is safe.
- 4. Mind and use a clearing bath as stated, to keep slide quite clear in the high lights.
 - 5. Always over develop in preference, as under development

means intensifying, but if over developed you can then *clear and* reduce at the same time by using a ferricyanide bath and hypo, as given in all the year books, in fact, as a rule, I always do so, and find I am sure by so doing of getting good results.

I have now given you a few rough hints on lantern plate making, and I can only say if any who read this do not know how to make slides, *learn at once*, that is, go in for it, buy a good book on the making of lantern slides (Hepworth's is a very good one and one of the best) and go to work at it till you are able to make a good slide.

CHOICE OF LENSES.

By Fred. H. Evans.

To anyone buying an outfit for the first time, this is the most difficult question to decide, what foci lenses will be the most useful?

The practice of naming lenses, merely by the size of plate the lens maker thinks they suit best, is, I think, very strongly to be deprecated. No lens should ever be known by any such title as a "half-plate" or a "quarter-plate" lens. Take the case of a beginner buying his first quarter-plate outfit; a friend of experience tells him that the most useful all-round lens he can buy, if he can only afford one, is a six-inch R. R; but the tyro sees that such eminent authorities as Ross & Co. quote as the lens for the quarter-plate outfit (without hinting that more than one is necessary or even desirable) is a four-inch Portable Symmetrical (a wide-angle lens), that evidently being their idea of "a quarter plate lens." What the tyro should be told, is, that if he means to produce pictures he will have to ignore the names of lenses, provide himself with at least three or four lenses of different foci, and in their use, be guided solely by the question of which lens gives on his ground-glass, the composition he has first made up his mind to try and get a permanent record of; he must see first of all a mental vision of his finished picture, carefully testing his point of view by all his artistic faculty, then try lens after lens till he gets the one of such a focal length, as gives on his ground glass the desired composition, neither more nor less.

We often see the criticism that such and such a photograph would be greatly improved by judicious trimming; this means practically that the lens used, would have been better employed on a smaller plate, or if the plate was not lessened in size then a longer focus lens was wanted to include *less* subject and thus to fully utilize the size plate and save wasteful trimming afterwards. The "covering" qualities of lenses seem to be the only characteristics that are expatiated upon in text-book advice as to selection of outfit; stress is never laid on the point that the focal length chosen, in actual use is to be solely decided by the fact that it and it alone embraces the desired composition, the exact amount of subject that has first been decided upon, as the picture to be taken away.

Advertisers should cease to publish such sentences as that "single achromatic lenses are invaluable for mountain scenery, "the distances being rendered in absolutely true perspective;" this means neither more nor less, than to achieve that true perspective, the correct focal length is chosen and therefore the distance is neither minimized or magnified unduly, not that any "single achromatic lens," irrespective of its focal length will achieve this "absolutely true perspective" simply because it is a single lens, and that a R. R. of proper focal length won't! I have quoted above from p. 231 of advertisement sheets of the British Journal Almanac for 1890; any reader who knew no better would be at liberty to infer that all the foci there quoted possess this miraculous power of true perspective, irrespective of the size of plate they may be used on, or the distance of the mountain or other distance from the camera!

Correct rendering of any subject, depends first on two things, the artistic sense in knowing how much of the landscape ought to be included in the finished picture, and the choice of a lens of such a focal length as will include that subject and that only. This, on a quarter-plate camera may mean anything from four to twelve inches; therefore the user of that size plate ought to be possessed of, say a four-inch Wide Angle Rectilinear or Portable Symmetrical (for exceptional use), a six-inch R. R., and then single achromatic lenses of say five, seven, nine and twelve inches foci; the back combination of his six-inch R. R. will give the twelve-inch single lens, and if he gets the five-inch as a R. R. he will then get a ten-inch single also.

Artistic work will then be possible—to an artist, and no artist is capable of artistic work without proper tools. It would be a gain to all if all, our well-known artistic workers in large sizes, would give their experience as to the lenses found most useful by them in actual experience for certain size plates.

MEDICAL PHOTOGRAPHY.

By A. R. F. Evershed, M. R. C. S., England.

Having been asked at various times by medical friends, to give them some hints upon utilizing photography in their practice, I am induced to offer the following notes as my contribution to the Annual, as they may be useful to other members of my profession on either side of the "herring pond."

The Camera.—From an extended experience of various sizes, I have come to the conclusion that the most convenient for medical work is 5x4; this is not too bulky for carrying about, yet gives quite a large enough picture for all practical purposes; the camera should have a double swing back and be capable of long extension; it must be well made, and be fitted with three double holders.

The Lens.—must be the best obtainable; it is only those of the first class makers, that really cover the plate with full aperture; it is best of the Rectilinear form, and the equivalent focus about 1½ times the base line of the plate; it is a convenience to have it fitted with the Iris diaphragm.

The Tripod.—It is essential that this be as as rigid as possible; it should also have adjustable legs, so that one or more can be shortened or lengthened at will, and it must be portable for carrying about.

Plates.—I prefer plates to films; it is difficult to keep the latter in register with the focusing screen, unless a roll holder is used, and a roll holder is extravagant, as a film has to be wasted each time any are cut off. For photographing patients with flash light, I prefer the most rapid plates, but when it is possible to give a prolonged exposure, either on some part where no movement is likely to take place, or on an manimate object, I prefer a plate of ordinary rapidity.

I cannot say I have found it an advantage to use Isochromatic plates, except with a yellow screen, either for photographing skin diseases or anything else, but when using them combined with a yellow screen in certain cases, where the pathological change depends upon color, I have obtained good results; it must be remembered, however, that the exposure is much increased.

Lighting.—In every case where movement is likely to take place, and especially in children, and in places where the lighting is bad, I use the flash light with magnesium powder, the

ment can be satisfactorily carried on. Obviously, I do not conclude the final washing after fixation. Should the ordinary light of the room prove insufficient, a candle or small lamp must be placed near the safety window, outside the box.

For the development of lantern or other transparencies on slow plates, there is no need for covering the open side, as the weak, reflected light of the room will in no way affect the result, but with more rapid plates, even of ordinary landscape speed, the precaution should be taken of tacking a piece of black silesia or similar material round the three upper edges of the box, and under this covering the work can be safely and comfortably carried on.

It may be suggested that but few wives or other relatives would put up with the mess resulting from my proposed procedure, but I submit that with only ordinary care, no mess whatever need be made; the whole "bag of tricks" can be set up in less than five minutes, and as speedily removed, and to those enthusiasts who wisely hesitate to risk the dangers of a chilly dark room, and are yet loth to entirely shelve their favorite hobby, I commend the plan here advocated. By its adoption, the Robinson Crusoeism of the photographer's den will be, at least temporarily, abandoned, and many an otherwise solitary hour, will be sociably spent in the simultaneous pleasures of watching the growth of the latest image and enjoying the society of our rela-To the many delights that photography tives and friends. yields to its votaries, I can promise, to those who follow my suggestions, the addition of vet another, in the practice of fireside development.

JUDGING AT PHOTOGRAPHIC COMPETITIONS.

By W. Jerome Harrison, F. G. S.

Having had some little experience as a competitor, as a judge, and as an organizer of photographic competitions and exhibitions, I venture to submit a few thoughts upon the subject. For competitions limited to members of any one society, I doubt if any plan can be found better than that which was submitted last year to the council of the Birmingham Photo Society, and under which their very successful local exhibition of January, 1890, was carried out. Its keynote was "Send the pictures to the judges,

instead of bringing the judges to the pictures." Another point was "One judge to each class." Get a thoroughly good man, and leave the decision in his hands alone; this fixes his responsibility and ensures a careful study of the work.

The mounted (but not framed) photographs, were sent in to the secretary a fortnight before the date fixed for the exhibition; he sorted them out into classes, and placed a number on the back of each mount; the same number being also put on the general list which he made out, from the lists sent in by each member with his pictures. The photographs were sent off by parcel post to the judges (care was taken to select no one to act as a judge who lived in the neighborhood), and thus the judges had nothing before them but a set of pictures, each with its number only.

It can be imagined that a judge would be better able to examine a set of pictures under these conditions—seated by his own fireside, and able with ease to handle the pictures and study them in the best light—than when walking round a public gallery "dodging the reflections" and liable to be biased by the opinions of his fellow judges, and by the knowledge of the names of the exhibitors, which (under these conditions) always seem to be more or less known to the adjudicators.

The photographs were punctually returned by the judges within four or five days, and were then fitted with frames (for which they had previously been measured) and hung as usual on the walls of the hall in which the exhibition was held. Although some fault was found with the fact that medals were withheld in certain classes (a proof of the careful work the judges had been able to do) yet in no case did I hear any grumbling as to the order of merit in any class; a fact which goes to prove that the judges had selected the best work.

Under this plan the Birmingham Society was able to secure, and at a minimum of expense, the services of the following eminent workers: Messrs. G. Bankart (of Leicester), Paul Lange (Liverpool), H. P. Robinson (Tunbridge Wells), Rev. F. C. Lambert (Cambridge), and A. Pringle, A. Stroh, P. C. Cembrano and S. H. Fry (London).

I must not be understood as recommending the above plan for adoption in the case of open exhibitions, as the difficulties about framing, etc., would be considerable. But for local or Society competitions I know of nothing better.

A word, too, on competitions instituted by journals, etc. For

several seasons most of our best workers never contribute to such competitions. They do not care to see their names in print among the unsuccessful contributors; and possibly they think they may be handicapped, in the eyes of the judges, by the fact of their previous successes. The following plan might be worth a trial: Let each competitor attach a motto, and also a number (containing at least four figures) to the back of his prints. After the judging is done, let the motto of the winning picture be announced; and the competitor then sends to the editor his name and address together with his number, thus claiming the prize.

As to the amalgamation of the classes for amateurs and professionals, this appears to be in the main wrong, and for the following reasons: The work of the professional is seldom the work of one man. The poser, operator, retoucher, printer, and mounter, all lend their aid. In many cases the man who receives the medal has had little if anything to do with the production of the prize picture. Again, the fact of the professional being in constant practice, and having such rooms, appliances and instruments as a man naturally possesses who "gets his living" by the art, surely give him an undue advantage. It is said by some -"But this advantage is only, or mainly, in portraiture." There are many professional workers, however, and the number is steadily increasing, who make landscape work their specialty. I have met such men in picturesque resorts, who have told me that they have been waiting for days or even weeks to get just the right kind of weather and light for the effects they desired to obtain: now an amateur cannot do this.

The institution of "Champion Classes" has been productive of decidedly good results, that I should like to see the rule that after a picture has once been medalled, it can only compete in a champion class, in force at all exhibitions. Then I would go a step further, and debar all pictures taking a champion prize from again competing for any prize whatsoever. But copies of such pictures ought to be acquired by all the photographic societies in the country. And here I cannot help remarking, that what has been one of the greatest advantages of the photographic negative, has also been the chief cause of the low value of a photograph. The fact that copies can be multiplied so easily that Brown, Jones, and Robinson can each purchase a photograph identical with that offered to ourselves, has always kept down the price of photo prints. In the case of published platinotypes, photo-

gravures, etc., it might be well that the negatives should be destroyed after a certain number of prints had been taken. This used to be done with most copper and steel plates used for engravings; and I believe that Dr. Emerson has taken the same course with the negatives used to illustrate his magnificent books on East Anglia.

THE SIZES OF PHOTOGRAPHS AND REASONS WHY PHOTOGRAPHS FAIL AS WORKS OF ART.

By John Haswell, D.C.L., England.

The tendency of the present time is, it seems to me, towards the production of too many photographs of large size and the neglect of the smaller sizes. Now, one of the greatest beauties of a photograph, if not really its greatest beauty, is its MINUTE-NESS; it possesses, within optical limitations, infinite fidelity of form, and in spite of color absence, infinite gradation of tone. Borrowing an expression more commonly applied to hand work (i. e., painting or drawing) we may call a photograph a "highly finished" production. Carrying art phraseology a little further, we may say that, photographically, objects are not conceived in broad masses after the manner of, say, Velasquez or Rembrandt; rather are they presented much in the detailed manner of Gerard Douw or Meissonier. And, if I may at once appeal to picture loving readers, who, I ask, would desire the cabinet gems of the latter school spread out to heroic proportions? It might, I think, be safely laid down that if we could by magic enlarge the tiny panels, at the very sight of which the mouth of the connoisseur (be he European or transatlantic) has long been accustomed to water with desire, to say nine or ten times their original surface area, the charm and the market value of the gems would in the end be almost entirely gone. I am quite aware that the most royal prince of All Littleness, Meissonier, has been styled, and perhaps justly, a masculine painter. His conceptions are truly virile and his technique is characterized by great vigor. It is said that the original cartoons for his works are usually wrought out on quite a large scale. But what then? He proceeds with his finished picture, keeping it of exceedingly small dimensions; so much so indeed that many of the details given by his exquisite pencil require to be examined by a magnifying glass to be fully appreciated. Meissonier does not adopt this method because he dare not show finished work on the scale of his cartoons, but because he knows that the supreme attraction of his painting is its minute truthfulness. If diamonds and rubies had generally been a hundred times as big as Nature has made them, would the one and two carat gems of our lapidaries be any less resplendent or beautiful? No. But it may be said in quibble that the large diamonds and rubies are much more valuable than the small ones. Granted. But, I ask, is that not because the large stones are so much rarer, and men are greedy and long to posses rarities? Turning to photographs again.

If defects of composition or execution be set aside, nothing I believe is more detrimental to the true success of a photograph as an art production, than want of proper balance between its subject and its size. What I mean is chiefly this: That there is a size which suits a photographic representation better than any other, and that, in the majority of instances, this size is small and not large. Any hard and fast definition of a large or a small photograph cannot be attempted; circumstances alter cases. But it may be convenient to assume that anything beyond a whole plate (81% by 61%) is a large photograph, anything on a less plate, a small photograph. How it comes about that there are so many large photographs may be a fair subject for discussion. My own opinion is, that it has arisen from the too common practice of using photographs by way of "wall furniture." Without wishing to discourage the use of enlargements where a good end is to be served thereby, I do say it is a great mistake to suppose that photographs can ever from an art standpoint, take the place of paintings and drawings. Photographs on walls may be excused by the fact that nothing more costly in the shape of a drawing or painting is available; or their presence may be apologized for, by the information that the subject is, for example, a loved face or a favorite church. But that is all. And why, asks the opponent, may I not frame and hang up a large fine photograph of anything I like, without offending my so-called artist friend! Well, let us sec. A work of art depending almost solely upon the genius of the human hand and mind and which is not the outcome of a mere mechanical or chemical process (I use these words for sake of distinction and not in any sense of disparagement to photography) as a rule borrows grandeur and dignity from size. With a photograph, however, the case is different; it does not gain importance by size, indeed its true beauty suffers by presentment on any scale which suggests a contrast with hand work. The reason seems to be, that hand work contains (or should contain) a large amount of SUGGESTIVENESS, whereas a sun picture has little, if any. With hand work as with artful poetry, the merit often consists rather in what is withheld, than in what is actually presented, in the beautiful images stored up in the mind, rather than by the polish of surface or the perfection of rythm. I have not intended to convey the impression that, in my opinion, all photographic pictures are utterly devoid of poetry or sentiment; I only meant that photographs are essentially weak in the elements of suggestiveness. The merit of a good picture is one thing, of a good photograph quite another. And the same canon of size may not regulate both media of representation.

When discussing the subject of the sizes of photographs, I consider it my duty to raise my voice (feeble though it may be) against the practice of making photographs of certain regulation sizes without any regard for pictorial composition. In other words, a print very often will be found to require a good deal of cutting down before it can become, to ever so small an extent, "a picture."

No doubt it may be urged, that the professional photographer must live, and the public will not let him live unless, so to speak, it gets its full pound of flesh; that, if we cut down the photograph, we must cut down its price, too. But, then, has not the professional photographer the remedy in his own hands, and if he will but apply it gently and with judgment, cannot he cure the public without doing himself any harm in return for his benefits? Let the 10x8 size remain a 10x8, and the 8x5 an 8x5, and let the fee be sufficiently remunerative. But, above everything, change the conditions under which the negatives intended for these sizes are to be produced. I fear the reason why we find so few-so very few-pictures, amongst purchasable photographs, is really because the photographers have no knowledge of what makes up a picture, and they go on exposing negatives without any intention of learning this very important part of a photographer's education. I was once weather-bound at an outof-the-way hotel in the English lakes, where was a large album

of views on sale. I looked very carefully through the series, and after due reflection concluded that about three out of every four were quite worthless as works of art; and all which possessed any merit at all had it in part only. In brief, the central portion formed the picture; the marginal regions were, beyond any expression which I can use, hideous and hurtful. The 12x10 shells which had an art kernal, should have been cut down to 8x6, or even smaller; and those of the whole plate size would have done as quarter plates. This experience has been repeated since by the writer, in quite another part of England with an album of quite a different class of views. Isn't the lesson taught just this: That whatever size of photograph we intend to take, we must operate with an optical instrument and a camera big enough (or, at any rate, long enough) for two "sizes" larger. A considerable sacrifice of picture angle, will, of course, be entailed, but by this method we shall be helped forward on the path of art; our pictures (in the best sense of the term) will become more numerous, our photographic abortions will die out. Commercially, too, the new commodity will, no doubt, be found quite as good an investment as the old. By way of coda, let me strike the note with which I started. Let me try to encourage the production of small photographs. Why should miniatures be left to our tyros, and why should our experts cling to monstrosities?

The method of working which has just been suggested, will, no doubt, seem to many impracticable under average conditions, as involving too serious a sacrifice of picture material; but I think it will be admitted by those who share such an opinion, that much of the disappointment felt (whether consciously or unconsciously) is largely due to the evils following upon the contrary practice—exaggerated importance of foreground, undue diminution of distance.

It will not be irrelevant, at any rate to a portion of my paper, if I cite the opinions of Dean Alford on photographs: "The mind forms its own idea of any object heard of, and expects to be corrected when the object is actually visited. But if we see a drawing of it, we correct the mind's idea accordingly, and do not expect to find ourselves utterly beside the mark, after all. And, of all representation, photography fails most signally to convey anything like the true idea of an object. All drawing is more or less according to our human appreciation of the relative magnitude of objects and of the parts of objects.

"A human soul, guided by a human hand, in tracing the outine and in filling up the details. Those features of general effect are most dwelt on, those details are most carefully filled in, which most affect our sensibilities. If the character of a mountain is rough and serrated, that character dwells on the mind of the artist, and prompts his pencil as he draws. If the character of a building is plain or ornate, from his conception of it as such, springs his representation of it; true, but not all the truth; truer, for not being all the truth. But photography is soulless and idealless. Behind the power that traced the outlines, sat no human genius; over the skill that filled in the details, presided no principle of appreciating selection. The glorious hills, so vast in our estimation, so full of beautiful gradations of light and color, are dwarfed down in the photograph, to a mere ungraceful line, just darkening above the horizon, uniform in its dreary shadow."

HINTS ON PICTURE MAKING.

By Richard Keene, England.

Having been asked to contribute my mite to the International ANNUAL, I cannot do better, perhaps, than drop a few hints respecting the production of pictures by photography. By pictures I mean representations of natural objects with some amount of art in them. And here let it be distinctly understood, that I do not claim for photography all the functions and possibilities of art. Much remains to be done, and which will be done, to improve photographs; for a really good photographer can no more help putting some of his individuality into his work, than can his elder brother, the artist; and though hampered in his selection of subjects by the obtrusion of incongruous objects, yet we shall find that the photographer with some art education or instincts and an innate perception of the beautiful, will produce pictures treading very closely on the heels of art proper. Indeed, in very many cases, photographs as much excel brush pictures in their art qualities as it is possible to conceive; for it must be remembered that every wielder of the brush and palette is not necessarily an artist. The same rule applies to photographers. we must ever look up to art for our best models to work by, and I would recommend all who wish to attain the highest excellence in photography, to study the works of great artists-men of genius whose works have stood the test of time, and who have created for us the love of nature in all her phases and moods. What we learn to admire we strive to copy. I know that the love of nature is an inborn principle in most civilized peoples: but the expression of it is difficult, either in painting or photography, without the guiding hand of those who have, by infinite labor toiled through many disheartening failures to their present high standing. Therefore study good pictures. Now it matters not how many good pictures you may see; when you go to nature you will always find something new-something which has never been copied before, and thus an inexhaustible field of enjoyment is placed before you, if you have cultivated the talent of seeing. And here I would note what a godsend the camera has been to many who hitherto walked the earth unconscious of the beauty with which they were surrounded and encompassed. Photography may only have been taken up as a fashionable amusement, a plaything, but it will doubtless add much to the pleasure and knowledge of its votaries, and enable them more to appreciate the beautiful world in which they live—in fact, they are acquiring the art of seeing. As the painter must undergo a severe training before he can hope to do aught worthy of notice, so must the photographer climb up the same ladder, with quicker steps, perhaps, but with many stumbles and failures. None may ever reach the top, but they may attain a standpoint from which to look down with pity on the poor daubers of canvas and spoilers of sensitive paper—the half hearted ones who have mistaken their vocation, and to whom schools of art and other art teachings are useless.

The following suggestions, trite and commonplace though they be, are offered to all who desire to creditably work:

Don't use a hand camera or films, before you have mastered ordinary plates in an ordinary camera. Let your camera be of the best make you can get, and don't fear a few ounces extra weight or a few pounds extra cost. Have a swing back to it, and long extension of bellows, so that you can use a lens of long focus. Wide angle lenses are an abomination; never use them when it is possible to avoid it. The longer focus lens you can use on any subject the better, as the resulting picture is more what the eye sees in nature, and therefore more natural and pleasing. A lens of long focus is indispensable in taking mountain scenery, ships at sea, or extensive views. A single lens is

best for landscape work. The best work is never done in a hurry. The best negatives are not those taken the quickest; sooner over expose, than under expose. Don't trust to exposure tables; they are of little use; nothing but experience, noting well the brightness of the image on the ground glass of your camera, will tell you how long to expose. It would be absurd to give the same time to a dull red brick house that you would give to the white stuccoed mansion next door. Always expose longer when the east wind blows. The quickest exposures are got after spring showers.

Never expose your plate with the sun at your back—I mean the back of your camera—for the illumination of your picture is then too equal all over, shadows are wanting, and the result will be tame and flat. Let the light come from one side or the other, or even in front of the lens (which should be shaded, of course); some good effects are got by the latter method. Indeed, the lighting of a picture is a most important part of your out door work—second only to the selection of your subject. I can, in the short time at my disposal, give but little advice on the latter, for it is largely a matter of taste. The study of good pictures will help you more than anything else. Read, mark, learn and inwardly digest what H. P. Robinson and Dr. Emerson say in their Picture making by Photography and Naturalistic Photography. Even the human face divine, varies in beauty when looked at from different positions. How poor and commonplace is the one compared with the other artistically.

In buildings, plump views are objectionable; they should always be taken at an angle, otherwise they will look only like architects' elevations. Contrive, if possible, to have some interest in the foreground of your landscapes; broad expanses of grass or water, unbroken, spoil many an otherwise good work. Get rustic figures for rustic scenes. Gentlemen in top hats and dressy ladies look out of place there. Don't fire away at every bit that takes your passing fancy or you will have no plates left for better things. In other words, study well your subject before you plant your tripod to take it. Always cover your slide before drawing it and never let the sun shine on it. An india rubber band will cover your diaphragm slot if your cloth is not large enough. But you will tire of my "do this and don't do that." In conclusion I would remark that there is no royal road to photography if you wish to excel. It is true, that now everything

almost is done for him, any fool can photograph—and even fools make plates at times—but only the carnest and painstaking pupil must ever hope to reap the full enjoyment, which comes of patient perseverance in the upward and onward path of photography.

A NEGLECTED DRY PLATE COLLODION PROCESS.

Wm. Lang, Jr., F. C. S., England.

In the Spring of the year 1861, the South London Photographic Society, a society now no longer in existence, organized a committee to report on certain dry plate processes then before the public. The processes at that time known as "dry" were those where the collodion employed had received an application of socalled preservative. The substances which were employed in thus "preserving" the plate were simply legion. The tanning process of Dr. Russell had at that time just been put forward and the same has to be said regarding the process which I would wish to refer to, in this communication. Accordingly we find that the committee in their reference to them thus dispose of them: "The tannin process and Mr. Hannaford's modification, they con-"sidered promising, but would at present more particlarly call "the attention of the experimental members of the society to The processes the committee actually reported on, were the Taupenot, or original Collodio Albumen process; the Fothergill, Pctschler and Manns, Mr. Davis' Collodio Albumen and the gelatine. The latter process, it has to be remembered, was not what we now understand by the term, but was a process where the use of gelatine as a preservative was recommended. For the benefit of those to whom these early processes are simply terra incognita it may be advisable to state briefly what operations were involved in the Tanpenot and in the Fothergill. In the former, the plate, after being sensitized in the bath in the ordinary way, was thoroughly washed; iodized albumen was then poured over it and after draining, it was dried rapidly in front of a bright fire. Plates at this stage were insensitive to light, to render them sensitive they were immersed in a bath of aceto-nitrate of silver and washed before being put aside to dry. In the Fothergill process the plate, after washing away the free nitrate of silver, received an application of albumen to which ammonia





had been added. The albuminous coating was then washed off, and in order to avoid stains which often appeared, an immersion in a weak bath five grs. nitrate of silver to oz. was often had recourse to. The modification which Hannaford introduced was pouring over the washed plate, a solution of albuminate of silver dissolved in ammonia, to be followed as are the previous processes by thorough washing. One of the members of the Glasgow Photographic Association, Mr. Patrick Falconer, who worked this process in the early "sixties," and still continues to work it, has shown me results, which for rapidity are something marvelous. Of course one has to remember, that at the date of Hannaford's introduction of his mode of working, the alkaline method of development was not then practiced, consequently the true rapidity of the plate was not capable of being shown. In some experiments Mr. Falconer and I made with the plates, we found that, exposure to an ordinary batswing burner behind an average negative for a single second, was sufficient to produce ultimately a good transparency. My friend had always found a certain amount of staining, when using the ordinary Pyro Ammonia and Bromide developer and although a formula with a large amount of sulphide of soda present, somewhat improved matters, still he thought they might still be further improved. I suggested the use of eikonogen, and it was with this developer, carbonate of soda being the alkali, that our joint experiments were made. It has to be stated, however, that the image as brought out in the first instance by any of the foregoing developers, is only a ghost of a picture. The image has to be strengthened by means of pyro acetic or citric acids and silver, after the method of intensification so well known to the workers of collodion. One element of success in getting perfect finished transparencies, is to see that the solution does not become discolored. It should be explained that before applying developers, the film should have alcohol poured over it in order to render more certain the subsequence operations and to prevent film slipping. It is almost necessary also to have an edging of varnish applied all round for the same purpose.

At the Birmingham meeting of the Photographic Convention of the United Kingdom, Dr. Hill Norris proved that he was able to produce a dry collodion plate giving all the rapidity of the ordinary gelatine plate. Subsequent results would not seem to have borne out the statement then made. It seems to me that we have in the process, the outlines of which I have briefly attempted to give, as great sensitiveness as it is possible to desire. It seems strange it has not been worked to the extent its intrinsic merit demands. It would be an important matter to discover whether it may not be, after all, the albuminate of silver which is the true susceptible agent here. One may perhaps account for Hannaford's method being overlooked, from the fact that collodion emulsions came to the front a year or two later, to be followed ultimately by the all absorbing gelatine emulsion. A rapid collodion plate having keeping qualities, would hold its own as an article of commerce against the modern dry plate. Dr. Hill Norris evidently thought so, and I believe that in this thirty year old process, all the desired conditions are to be found.

EXHIBITION NOTES.

By Rev. F. C. Lambert, M. A. (Camb.).

It is an interesting thing just now, to bring to mind the average photographic exhibition work, etc., of three or four years ago, and compare it with that of the present time.

First, in the matter of subject. It is undoubtedly a healthy sign of the times, that all workers for exhibitions are showing a very marked advance in the degree of the care with which the selection of subject is made. The well worn term *art science*, as applied to photography, is giving way and workers are more or less diverging towards either the one side or the other.

In the wet plate days (which some still regard as the "summum bonum"), the science side reigned supreme; but we are now, perhaps, a little weary of the "sparkling negative," and find more æsthetic satisfaction in seeking for that end, of which a negative is but a means.

In photography, as in all other things, there is the pendulumlike swing, first to the one side then to the other, and it behooves us to be cautious in following any great movement to an extreme. From exalted technique, the pendulum seems to be fast moving on towards a school which affects to despise careful manipulation.

It has been well said by a living worker (whose works, both photographic and literary, should command respect), that "it is not the mission of photography to produce smudges." It may,

perhaps, be said with equal truth that it is not the mission of photography to become a handicraft only. There is in most things a "via media," and we may now and again remember the old Latin grammar quotation "via media via tuta."

To return to our "subject." The question of selection (composition, etc.), is one in which we may see a greater advance than perhaps in any other respect. And in this direction we may still hope for further advance without endangering extremes. The most desirable matter of selection of judges, is destined to receive shortly the attention which the vast importance of the subject deserves.

When work is commended by men of artistic culture, for its art worth, then, of course, workers will seek for that commendation by striving to cultivate art perceptions and infuse them into their work.

This has been begun, and we may venture on the prophecy that the next few years, will more than equal the advance made in the last few years.

With respect to treatment, there may be seen a strong current of refinement; selection and treatment are greatly interdependent. We may note a healthy general effort for originality, replacing what can only be termed feeble imitation, too common not long ago.

The self evident want of harmony of parts (sky and landscape, dress and figure, etc.) are growing rarer.

The "show case specimen" of the retouchers of ART (save the mark!) is destined to follow the Dodo, let us hope, and become a "rara avis in terris."

As regards process, too, a very marked change has come over exhibition. The meritricious gloss of albumen, is no longer rampant. Platinum is replacing gold and silver. Black and gray tones are on the rapid increase. Matt surface is no longer an eccentricity.

And again, it is not so common as in aforetime to see a picture of shipping, ruins, portraits, clouds, etc., all beautifully brought into sharp contrast in one frame.

It takes no great wisdom to see that "strikes" are a feature of the times, so that it needs but a modicum of the prophetic spirit, to forecast the formation of a union league, or some such amalgamation of exhibitors, who feel sufficient interest in the future of exhibitions. That there is much to be thankful for, in the way of improvement it would be ungracious to deny; at the same time, it would be equally idle, to deny that there is still room for further improvement, and which we do not hesitate to declare to be within the reach of patience, experience and union of those who seek art for art's sake, rather than the applause of men.

ON THE DIVERSITY OF LENS MOUNTS.

By J. Leisk, England.

"Changes are lightsome" is a Scotch proverb, the truth of which will doubtless commend itself to every one who has got beyond the rudiments of photography and who follows the art for other than mere mercenary considerations. The many printing processes available in the present day, on paper, opal, etc., enlarging and the making of lantern slides or transparencies, make it possible for the possessor of one good negative to employ many a leisure hour in a most interesting and instructive manner, without feeling the slightest monotony in the manner of working or in the result produced; but this variety which is so fascinating to the intelligent photographer, altogether fails to charm, when it comes in the form of an assortment of different sized flange screws and hoods fitted to lenses that ought to have these parts uniform.

Writers on the subject have advocated the desirability of lens makers adopting a standard size of screws, etc., for lenses of a certain class, quarter plate, half plate and so on, so that in ordering a lens from any maker it would only be necessary to state the size of camera it was for, in order that it would fit the flange attached to the camera, and also that shutters made for same sized camera would fit the hood, just in the same way as dry plates are made to fit the different sized cameras in the market. Such an arrangement would be a great boon to all who aspire to the use of more than one lens; but to show how far off we are from that happy millennium, the following personal experience with the lenses of one well known British maker will show.

I first purchased a camera fitted with a landscape lens. Shortly thereafter I ordered a rapid rectilinear lens for same camera, but found when it came to hand, that both flange screw and hood were different in size from the first one, so I had to

make an extra sliding front for my camera before I could use it. The optical performance of the R. R. lens was excellent, and about a year later a friend asked me to procure a fac simile of it for him, which I did, ordering it direct from the maker, but on receiving it I found that, though numbered the same in catalogue and optically identical with my own lens, both flange, screw and hood differed from it, by fully one-sixteenth of an inch in diameter! I next ordered a short focus doublet lens for the same camera, but found that it also had a mind of its own; it differed in size of flange, screw and hood from the three lenses above described, though curiously enough the lens screws inside the tube were identical and interchangeable with those of the R. R. lens. I have been thus obliged to provide myself with three sliding fronts for my camera and a set of adaptors to make my shutters fit the different sized hoods, and for no better reason, as far as I can see, than either the love of variety or "pure cussedness" on the part of the maker.

With the optical qualities of the lenses described, I am fully satisfied, and the lenses themselves being so nearly the same size, it seems like boycotting otherwise good work, to send them out in such a senseless variety of mounts. I feel convinced it would be a saving of expense to makers and no end of convenience to customers, if a standard size of tube, flange, screw and hood were adopted for each size of camera. If such a proposal was taken up and advocated by some of the leading photographic societies, I have little doubt, lens makers would see it to be for their interest to give effect to it, and those who first did so, would score one in their own favor. At any rate I think the subject is of sufficient interest to form my excuse for calling attention to it by the readers of the International Annual.

LENSES FOR LARGE HEAD STUDIES.

By C. Hethton Lewis, Brighton, England.

There is a certain fascination in the endeavor to produce large size portraits, and the difficulties we have to contend with may to some extent enhance the value of a good picture. Many amateurs are smitten with the desire to exhibit their skill in taking a very large size head picture, and the attempt is by no means prevented because their apparatus happens to be only a half or

whole plate set. They find that with a double extension camera and a half plate lens of about 8½ inches focus or with the whole plate lens of some eleven inches focus, that an apparently grand image may be secured, and it does not appear of much consequence that the lens during the taking of the picture is only a very few inches from the sitter's face. In fact to get a life size head with the 8½ in. focus lens it only needs to be racked out to seventeen inches and "there you are."

Now large head portraits are one thing and large head deformities and monstrosities, are quite another thing, the proper way to originate the latter is to use a camera and short focus lens as mentioned above.

To be a little more explicit on this subject, let us consider under what conditions and with what sort of lens, large head studies should be made. In the first place let us bear in mind that one of the chief disadvantages from which our picture will suffer, will be the distortion of perspective, and ungainly appearance of the figure and face, if the lens is of so short a focus as to bring it close to the sitter.

Our point of view then, is of the utmost importance to study, and it is acknowledged by the highest authorities that the best pictures in ordinary studio work, are secured when a lens is used that permits of some twelve feet or more distance, from sitter to lens.

For my own part I always use a cabinet lens for taking C. de V. portraits and so on, and the result is far better. Now with regard to large head studies, say heads of from six to eight inches in height, we shall find it desirable to use a lens of from twenty-two to thirty inches equivalent focus, and although this will land us rather near the sitter's face, there are other considerations which detract from the use of still longer focus lenses; the reasons, being purely optical, cannot now be touched upon.

Before dismissing the statement that long focus lenses are necessary for this work, I should like to suggest that anyone can prove the matter by taking a portrait, say a 1¾ inch head, with a five inch focus lens, and another picture of the same subject but with a lens of fifteen inches focus; both heads to be 1¾ inches in size, and the point of view and other arrangements precisely identical; the only exception being that in the one case, the short focus lens will be about two feet six inches from the subject, whilst the longer focus lens will stand some seven feet six inches

away. A reference to and comparison of the resulting pictures will afford interesting scope for investigation.

Further information, together with a diagram of two figures taken under conditions described, will be found in Vogel's "Chem istry of Light and Photography."

A cause of distortion may be noted. When short focus lenses are used, it is seen, that to get a good focus on the ear, the camera is racked to a certain distance, and provided the open aperture of the lens is used it will be observed that the nose is not in focus. We now rack out the camera and get definition—for a fuzzy proboscis would certainly put the sitter's nose out of joint when he saw it—but in securing this object, we recognize at once that as the lens is nearer an object the more that object is enlarged! Therefore the nose is not in due proportion to the size of the ear, etc., with the short focus lens. (See Mr. Dallmeyer's interesting paper in the "Photographic News" for August 23, 1889.)

The next question of importance is the selection of the lens. Portrait lenses are naturally considered to be the best for the purpose, but why? Without going fully into this subject it will suffice to say that the portrait lens is constructed to work with a large aperture, and hence is very rapid in action. When, however, we come to lenses of very long focus we find our "depth of focus" decrease so much that to get the ear and eyes in fair focus we must insert a small stop, this consequently reduces the chief value of the portrait lens, namely its rapidity, and we might with equal advantage use a doublet lens of the Rapid Rectilinear type working at f 8. This will yield us an excellent image till we come to a focal length of about twenty-six inches and we shall then find our image can be sharply focussed, only, over a small extent of the sitter's face. Our depth of focus has decreased and to secure better definition over the various planes we must insert a stop in our R. R. lens, say f 11. We now find that we have an image of considerable sharpness in one plane, together with a considerable loss of detail in other planes. In fact we are using an aperture that a good single lens will advantageously work at.

Again let us notice particularly the kind of image we get by using the doublet lens with its f 11 stop. The depth of definition is sufficient, the marginal rays are fairly in focus, but the balance of sharpness is not good, and for this reason: the lens gives too great sharpness in one part, and shows up contrast in other planes which are lacking in definition. This fact would prevent

the best artistic result being attained. We turn therefore to a special lens that has an arrangement for overcoming this difficulty. I allude to the valuable patent diffusion of focus arrangement, invented by Mr. Dallmeyer, and to those who can afford his justly celebrated "D" lenses, I can say by all means get one. With this lens, which is a more rapid one than the ordinary Rapid Rectilinear, we have the very power we want. By unscrewing the back component of the combination, we purposely introduce a certain amount of spherical aberration and on examining our image we find we have the grand power of reducing the intense sharpness of our image in the one plane, and distributing a most pleasing softness of definition over the whole picture. We now have harmony and yet at the same time secure all the definition that we require.

We fancy we hear many a sigh when the expense of these lenses is taken into account, and to those who are not fortunate enough to secure a "'D' Dallmeyer," then I say take courage and get the next best and far less expensive lens. This, as will be surmised, is our friend the Single Combination Lens.

Those of us who have portrait lenses, may have tested the value of using the front combination of a portrait lens alone; that is, having removed the back combination and unscrewed the front one, just insert the front lens where the back one was. The focal length of the lens is about twice that of the portrait lens when used intact, and so we may happen to get the focal length we seek. Then by stopping down to about f 11 we can get good results in large head studies.

There are many, who do not possess portrait lenses and to those who wish to take up this interesting subject I can offer practical personal testimony to the great merit of a special single combination lens constructed and designed by Messrs. J. Swift & Son, London, W. This lens was carefully worked out, so as to give exceptionally excellent results with a large aperture, and with more brilliancy and freedom from flare, than the front combination of a portrait lens; moreover the curvilinear distortion found in ordinary single lenses, is here so light as to be of no moment. I find I can get capital definition when taking a large head portrait, with the very large and rapid aperture of f 8!

This "Swift" single lens is composed of three glasses, one of which is of the new yena make, and thus a most effective combined triple cemented lens is produced, ensuring better flatness

of field and good covering power. The advantages of single lenses are that there are but two reflecting surfaces, and hence we get more brilliancy, and comparatively greater rapidity of action. There is also a certain amount of the desirable spherical aberration present in them and thus we can insure an artistic result in our picture.

The lens by Messrs. Swift is so constructed as to allow of a stop to be used, so that the depth of focus may be adequate and yet at the same time to provide that a proper residuum of spherical aberration should still be present to give charm and harmony to the whole subject. Moreover, this is arranged without throwing the picture into that fuzzy and quite out of focus style, which is not complimentary to anyone.

Finally, after having found the lens, you must find a subject, and the style of features, complexion and texture of skin must be considered, so as to minimize the retouching which cannot be dispensed with.

Pose and lighting are of vital importance, especially the latter, for a portrait taken with a single lens will require different lighting to that taken by a double lens, so as to get relief and roundness.

Having come to this point I leave my readers to "go in" for large head studies; I say *studies* advisedly, for then the actual *likeness* is *not* of such paramount importance and the work is thus easier.

PYROCATECHINE DEVELOPMENT.

By Rev. John A. Lloyd, England.

A new developer is always a matter of curiosity and interest amongst photographers generally, and some notes of experiments made with the isomer of hydroquinone may be acceptable to the readers of the INTERNATIONAL ANNUAL. To begin with the plates, those chiefly used were Fry's "slow," the pyrocatechine was obtained from Mr. Martingdale, chemist, of New Cavendish street, London, and the first formula tried was made up in accordance with that given by Mr. Clement Sans in the *Photographic News* of December 20, 1889. With this developer, the first signs of the picture on the exposed plate were visible in one minute and a half after pouring on, but a quarter of an hour's

development failed to obtain good printing density, whilst a plate simultaneously exposed, but developed with hydroquinone, though not showing the image for two minutes, in ten had attained a proper density. My camera being 8x5 I exposed my plates (5x4) with stereo shutter, in pairs. I consider the formula, with the plates which I used, to contain too much sulphite of soda, and the accelerator to be stronger than necessary.

I next tried one-half grain of pyrocatechine to three grains metabisulphite of soda, plus one grain potassium bromide, in one and one-half ounce of water, using the same accelerator and making the mixture up to a volume of three ounces, with distilled water. Result wanting in density. On increasing the strength of the pyrocatechine to one grain per three ounce volume of developer, the density was good. For the sake of convenience I will here give Mr. Sans' formula in English measures; the soda carbonate used was recrystallized:

Distilled water _________2 ozs. 1 dm.
Solution of sulphite of soda, at 40 per cent ___2 dms. 50 mms.
Solution of pyrocatechine, at 1 per cent _______ 34 mms.
Solution of carb. soda, at 20 per cent ______ 51 mms.
Solution of caustic soda, at 7 per cent ______ 34 mms.

After a great number of experiments, I can now give three satisfactory formulæ, premising that I do not consider a developer satisfactory, that will not give printing density to a negative without the application of an intensifier, the exposure being correct:

Formula No. 1.

1.	Soda sulphite	1	oz.
	Water	6	ozs.
	Dissolve and add pyrocatechine 12 grains	s.	
Π.	Soda carb	400 grai	ns.
	Soda hydrate	48 grai	ns.
	Water	6.028	

Use for normal exposure 2 dms. of No I, 1 dm. No. II., and make up in volume to three ounces, with distilled water.

Formula No. 2.

I. Soda metabisulj	phite	20 grs.
Water		10 ozs.

Dissolve and add pyrocatechine 5 grains.

II. Pot. carb	z.
Soda carb 1 o	z.
Pot. ferrocyanide 1 o	z.
Water10 o	
Use I. and II. in equal parts for normal exposure.	

Formula No. 3.

Soda carb	400 grains.
Soda hydrate	48 grains.
Water	6 ozs.

To three ounces of water, add one dram of above, and add at the time of development, one-half grain of dry pyrocatechine. Stir till dissolved, with glass rod. This developer soon turns color, but I have developed a second plate with excellent density after it has been made up over a week. The resulting color of the negative is an umber brown, which shows up as a positive, to a peculiar degree.

Pyrocatechine keeps excellently in a dry state, in a well corked bottle. I have had some for more than a year and it shows no signs of deterioration. It keeps both in solution (with and without preservative) and dry in crystals better than hydroquinone, to which it has strong resemblance.

It is a very similar developer to eikonogen, giving less contrast than hydroquinone, but greater softness and harmony, with absence of stain.

I shall hope to give you the results of experiments in the development of rapid exposures on rapid plates, transparencies and bromide paper, on a future occasion. The following letter from Professor Benoist, of the Lyceum at Toulouse, to me with reference to pyrocatechine will be of interest to your readers:

Translation.

- "Pyrocatechine gives, compared with hydroquinone:
- 1. More vigor in the development.
- 2. The same dark color of negative and very brilliant.
- 3. More harmony between the high lights and half tones.
- 4. The developing solution is less alterable, even exposed to the air, and may be used almost indefinitely.
- 5. The price is unfortunately the only obstacle to the regular use of this substance, which is still two francs per gramme, but as its manufacture does not present any special difficulty, this price will go lower as the demand increases, as has been the case with hydroquinone.

As to the proportions, you can make a one solution developer in the manner following:

d (Water100	grammes.
Solution.	Sulphite of soda	grammes.
国	Dissolve and add	
So	Pyrocatechine	gramme.
	When dissolved, filter and add	
One	Carbonate of soda 16	grammes.

It is often convenient to have by you a normal solution of sulphite, containing 250 grammes to a litre, and a normal solution of carbonate of the same strength.

In which case you take

Solution normal of sulphite _______32 c.c. add pyrocatechine one gramme, filter and add solution normal of carbonate _______64 c.c.

This developer may be increased to the extent of half its volume of distilled water.

Note.—The salts of potassium may replace the salts of soda in the same proportions.

In the Summer, by a good light, and for correct exposures, use only an old solution or a new one diluted to half its yolume with water. I shall be happy if these instructions should prove of use and enable you to appreciate the great advantages of the discovery of Pyrocatechine.

Old baths keep very well in stoppered bottles full to the neck, and may be used many times. Hydroquinone made up according to one of the usual formulas, makes an excellent intensifier for plates wanting in density when developed with pyrocatechine or brenz-catechine, as it is sometimes called—catechol being its systematic name with a formula C_6 H_4 (O H_2 .

After development it is better to use an alum bath before fixing, washing the plate before and after the alum bath.

Pyrocatechine will be found to give fine modelling to the whites and therefore makes an excellent developer for portraits, quite equal to eikonogen and superior to hydroquinone in this respect. In conclusion, it is to be hoped that not a few of our numerous body of amateurs will be led to make experiments with this new developer, and that they will record their experiments carefully for the benefit of others, not forgetting to use only distilled water at a temperature of about 60° F., or failing

that, filtered and boiled rain water for mixing the developer, what is called "hard water" being entirely unfit for most photographic work, this being especially the case with the pyrocatechine developer, because the amount of pyrocatechine in solution being very small, if the water was very bad it might all be precipitated and the developer rendered inert. There is room too for an enterprising chemical manufacturer to put upon the market this substance at a cost which would enable it to come into more general use.

THE UBIQUITOUS AMATEUR.

By G. H. Loomis, Newtonville, Mass.

"Take your picture and shine your boots for a dime," was the subject of illustration in a recent New York pictorial. A camera under one arm with brush and box under the other, was sufficiently suggestive to excite our admiration of the sublime and ridiculous. "Business is business," and the boy artist was wide awake to the possibilities before him. He had got the latest marvel of money making, in the way of a condensed camera combination and while he was polishing the understanding of his patrons he secured their types and shadows with astonishing rapidity.

In only one short lesson he learned to "touch a spring and turn a crank and then presto change!"

What if the other members of the "Brush and Shine Trust" did ridicule him for belittling the profession. He must have his bread and butter and the fun of eating it.

He is a bright boy and no doubt is ambitiously treading the first rounds of the ladder that leads up to the temple of fame. Go it young Angelo! but don't lose your hold on "Day and Martin" 'til your calling and election is fairly sure in the new departure.

This little prelude introduces us to an interrogation point. What of the Amateurs? are they liable in their fun and frolic to kill the business? I mean the photograph business. Guess not yet nor by and by. To be sure they are picking up a few crumbs from the master's table and gleaning somewhat busily in fields occupied by the regular reapers and perchance now and then pocketing a few pennies as the result of "scattering"

shots" along the lines, but we hardly think they are here for conquest or in a war of extermination. Though the simile may not be exactly apropos, I remember when quite a small lad, of chasing without malice aforethought a harmless "hop toad" to put him to death for invading my playground, when I was accosted by a thoughtful old man, who pleaded for the life of the toad, assuring me that the defenseless victim, like myself, had his inalienable right to life, liberty and the pursuit of happiness and that there was ample room on this terrestrial ball for both of us. I caught on to the big thought, as small as I was and ever since have respected the rights of the minority.

The amateur army is the natural outcome of simplified photography. The wonderful ingenuity displayed for the past five or ten years in the manufacture of equipments and outfits, and the extremely low price at which they are offered, has enlisted the attention and patronage of thousands, who purchase them for diversion and as a means of education for the young people. The amateur printing outfit has had and perhaps is having a similar boom and presses and type have had as big a run as the camera and dry plate. "Fire away" ladies and gentlemen and "if at first you don't succeed, try, try again." I know of one young enthusiast who has focussed through nearly all the cameras and lenses yet invented and who has nearly exhausted the different brands of dry plates in his efforts to fly the champion pennant in mechanical, chemical and artistic effects, still unsatisfied and sadly regretting that his last dollar has gone and his researches closed for repairs.

Though our amateur friend used time and material to excess, he declares it paid in the way of experience and diversion, and, having paid his bills, he thinks what was his loss must be the stock dealers' gain and with good credit he will yet resume and finally reach the zenith of his ambition.

We all remember when the tin-type craze started and the fears entertained by the regulars that it would work mischief as a chief substitute for photographs, especially during the war, when enlisting soldiers and their friends could not wait for photographs, these tin or melainotypes were taken everywhere and by everybody indoors and out, in traveling cars and woodsheds, till almost every man, woman, and child had been done on tin or leather. It is safe to say that more than one-half of the slain in battle or those who never returned, left no other personal pictures, and

these poor but cherished souvenirs have found their way into the regular studios all over the country, for copying and enlargement, yielding paying profits to the regular profession. "It is an ill wind that blows nobody good," so says the proverb, and in view of the unexpected generally occurring, it is best to catch on to the other maxim, "Not to despise the day of small things."

If the naughty amateur has done something to demoralize the business, he has done not a little to develop it. Our studios contain many proofs of his skill and ingenuity, sought out and perfected in leisure hours and which are found serviceable in facilitating and economizing our labors. We are not now to discuss the question whether labor saving inventions are for the good of the masses or for the benefit of the few who control them. We leave that to the village debating clubs, but whether decided in the affirmative or negative it will make no difference; as invention, innovation and progress will keep right on, till "old things are done away and all things become new."

We know of but very few photographers made wealthy by operating the business, and fewer still of the amateur persuasion who own corner lots and brown stone fronts from income derived from free hand photography. If the amateur is prospecting for a paying pursuit, his purpose is praiseworthy and legitimate and if, perchance, he is blessed with a plenty of leisure and lucre and is willing to substitute diversion for dividends, in his outfit investment, why should his right of way be questioned or he be regarded as an intruder into the fields of free trade. Amateurs are not long lived, and but few of them outlast the novelty period of their probation, but as many of them are doing service pro bono publico they have our permission to continue.

ADVICE TO AMATEURS.

By E. J. Lovejoy, England.

My observation of the reckless exposure of plates by many amateurs, regardless of conditions of light, etc., has induced me to make it the subject of a few remarks as my contribution to this year's Annual. Many amateurs, particularly those who have only just joined the ranks of workers in our art science, seem to have formed the idea that the greater the number of plates they expose during an outing with the camera, the more

proficient they become in their knowledge of photography. A greater mistake could not be made, and, with the exception of the plate manufacturers, it benefits nobody. I have been out with men for an afternoon's ramble, who have started with six double slides carrying twelve plates, and whose chief object appeared to be to expose every plate before returning home, no matter what the subject or whether it was suitably lighted, or chosen from the best position—no thought as to composition or anything else which goes to make an artistic and pleasing picture. No greater mistake can be made; far better is it, to make one good picture and bring the remaining eleven plates home, than to expose the whole twelve hap-hazard, which, when developed and printed from (if they ever are) are not fit to be seen. I would impress upon all who take up photography as a pastime and who desire to excel in their productions, to keep this matter ever in mind and never to expose a plate on any subject, without first well studying its composition, lighting, etc., when the result will be a stock of negatives which will be a pleasure to look at, instead of a heap of discarded plates thrown into a corner to be eventually deposited on the dust heap.

SOME OF MY FAILURES.

By "D. M.," England.

The editor asks for a contribution to the Annual, and though sorely beset to find a subject worthy of its pages, such an invitation is not to be lightly set aside.

We are all very ready to bring forward our successes, but we hear very little of the failures, and yet as much or more may be learned from failures than from successes, provided, only as we set to work fairly to try and find out where we came to grief. I have often thought it would be interesting to know, what is the proportion of failures to successes of such men, as say West or Symonds, whose yacht studies are so much admired. I am, therefore, going to spend a few brief lines on some of my failures during the past ten years that I have been at dry plate photography, and leave it to the tender mercies of Mr. Editor to consign the MSS. to the waste paper basket or not, as he thinks most proper.

I commenced dry plate photography in 1879. Having had

some experience of the collodion process, I started on the same lines, viz., a dark (?) room, shielded only by a piece of yellow calico, and exposures of ten or fifteen seconds in bright lights with $\frac{f}{g}$ stop. Plates were a good deal slower in those days than

now and vastly dearer-quarter plates three shillings a dozenbut as any modern tyro could now easily predict, the result was fog, fog, fog to any extent. A trip to Italy the following year proved also a ghastly series of failures from the same cause. Towards the end of the following year I obtained a much better camera, 71/2 x 5. I had formerly been using a quarter plate, the backs of which fitted very badly and were for a long time the undiscovered cause of many troubles. I now began to progress fairly, and a second trip to Italy was much more successful. Photographers were few and far between then, and it was not at all so easy to get a knowing friend to point out one's errors as it is now. So I floundered on. Another mistake I fell into, was in getting a stand too light for my camera-a fault of many modern stands-and hence had much needless difficulty in avoiding vibration and hence loss of definition. In those days photographers thought that too much of the view could not be crammed into the plate, and the lens lux mentor obtained for me was a six inch wide Angle Ross to cover a plate 71/2 x 5. That purchase was, in some ways, also a mistake, but it has proved a very useful instrument for many things other than landscape. Having commenced with the Scylla, of monstrous over exposure, I naturally fell into the Charybdis, of under exposure, which is of the two the worst error, for if you know you have done it almost any amount of over exposure can be remedied in developing by the judicious use of a restrainer, while no forcing with accelerator will avail if the plate is much under done.

Another source of failure was brought to my notice by a young lady who never could get her pictures sharp. I took one with the same camera, etc., and it was all right. On watching her I found she shook the camera every time she took off the cap. After that was pointed out, her negatives were all right as to definition.

On one occasion I had a sore experience of the result of neglecting little things. I was copying a series of documents on large plates, and was exposing as quickly as I could change the parchments. In trying another lens I inadvertently left out the

binding screw, which, as it ought not to have done, led direct into the camera. I exposed eighteen plates before I discovered it, and as the screw hole was nearly as large as the diameter of the stop, every plate was ruined. I developed the first and last and both being fogged in the same place, I concluded to waste no more developer on the intermediate ones. Again, a most irritating source of failure has happened, through a shutter not fitting tightly on the lens. A charming yachting scene is before you; in your excitement, the release is pressed too hard and the shutter slips off and all is destroyed. Nearly, but not quite as bad, is the moving part of the shutter sticking at a critical moment. By the time the shutter is in order the object of course is gone.

One more failure—a very recent one—and I have done, although I have by no means exhausted the list. I was photographing an illuminated manuscript with isochromatic plates and a yellow screen. The image appeared in due course and with a fair amount of detail, but no printing density could be obtained.

I rang the changes on pyro and hydroquinone to no purpose, till at last it was suggested that I was under exposing. Now, under-exposing, generally means too much density and no detail, while here I had detail enough and no density. On trebling the exposure I found that undertiming was the fault, and this was subsequently confirmed by finding that with proper exposures, the density varied with the amount of ammonia used, more than with the pyro. Some of the errors above emumerated are less likely to occur now than when I began, as the cheaper forms of apparatus are now much more reliable, but some are still quite possible. So that if this rambling effusion prevents even one beginner falling into one such error, it may not have been quite useless.

SOME THOUGHTS ON THE ART SIDE OF PHOTOGRAPHY. By G. Mansfield, England.

There would seem to be little doubt that the principle progress made in photography during the last year, has been in the direction of a higher art tendency both in theory and practice. It is impossible to speak on this subject without referring to a book which has had a large part in giving this artistic impulsion to modern photography.

Both in its theoretical and its practical parts, Naturalistic Photography has set many photographers thinking in a new and higher direction. Much as most of us differ in many of the sweeping assertions and narrow views put forward in that book, none can help feeling grateful to Dr. Emmerson for the outspoken claim to artistic power in photography he has put forth, and for the admirable practical advice he has given to photographers for obtaining artistic results in their work. the following passage he no doubt makes a very bold claim, but one which we may all hope time and the devotion of the artist photographer will justify: "Photography stands at the top of "the second or tone class, of methods of expression, so nearly "perfect is its technique that in some subjects it may be com-"pared with the third or color class. The scale, here too, is limit-"ed, but less so than any other black and white method. "drawing is all but absolutely correct. . . . It renders the "values relatively correct, if orthochromatic plates are used, "and it renders texture perfectly." Having an instrument that is thus nearly perfect it remains for the artist to use it, in the reproduction of nature, with that feeling and with that skill which is the fruit of long study and training and the reverent and intimate appreciation of nature in its most beautiful aspects. The principal controversy which has taken place concerning the theories put forward by Dr. Emmerson, has been on the question of definition or focus, though it would seem that there are many more interesting and debatable points raised than this one.

Many able and experienced photographers have argued on the side of the most absolutely sharp focus obtainable by the lens, yet surely very few have put this in practice; the use of the largest possible diaphragm has been for a long time an axiom taught in every beginner's manual of photography, and I think there are few who have not some time or other seen a photograph in which the definition was painfully sharp. The existence then, of an artistic focus must be admitted by all, and it only remains as a matter of dispute, the amount to be used and tolerated; and here I think the matter must be left entirely to the artistic feeling of the photographer and to the impression conveyed to him by the subject he seeks to reproduce. There is, however, a serious danger of exaggeration which must be carefully guarded against. Diffusion of focus should not be used to alter the subject we are reproducing; we have no more right to pro-

duce an artificial haze or alter the atmospheric relations of foreground and distance by means of the focusing screw, than we have by means of the retouching brush. At the Camera Club conference, a very able paper on the "Limitations in the treatment of subjects by Focus" was read by Mr. Thos. Dallmeyer, the illustrated diagram which accompanied it, showed plainly into what serious errors the overdoing of softening of focus may lead us. Not only were forms completely altered as to size and shape, but the gradation is in some cases entirely lost, dark spots becoming light ones.

A point more difficult to deal with than focus, which must be in a great measure a matter of personal artistic perception and training, is the necessity of the general adoption of orthocromatic plates in the practice of landscape photography for the correct rendering of the color scale. A good deal has been done lately in perfecting these plates, still however the results seem at times so uncertain, as to make many photographers skeptical as to their utility, and this militates against their general adoption. Photographers as a rule are perhaps too conservative of old methods, but in this case it is a matter of theoretical necessity, if we would obtain true results from the art point of view. There is doubtless room, for a considerable amount of improvement in the plates themselves, but these improvements cannot be hoped for, until their weak points are more thoroughly brought out by their general use by practical photographers.

A matter of minor importance and which many are inclined to look upon as a matter of fashion, though in art, the word fashion should never be applied, is the taste for prints on mat surface paper, which has become so general during the present year. Now I am inclined to think that this has a higher artistic tendency than a mere matter of improved taste. The fact that lately the very roughest drawing paper has been successfully used for the production of photographic prints, is another outcome of the better understanding of the subjectalready discussed, viz., artistic focus, as on rough paper microscopic definition is reduced in a very effective manner by the breaking up of the lines. One thing is certain, and it is a matter of congratulation, the bright surface of albuminized paper is, at least for large work, a thing of the past.

I will terminate by hoping that the strong artistic impetus

that photography has received this year, may continue during the coming season to emphasize the art bearing of all work produced on the camera.

PHOTOGRAPHERS AND INSURANCE.

By George Mason, Glasgow, Scotland.

There has been considerable stir lately, anent the photographer and the insurance of his studio. Doubtless the subject will arrange itself, and charges and risks will settle themselves down to the satisfaction of all parties concerned. On this subject, however, I would draw the attention of the insurer to one point in his arrangments that is almost invariably overlooked, viz., having an inventory of his place and effects on hand in some safe place in case of fire.

This inventory could be added to, year by year as new things have been procured, and the list should always be lying aside in a completed form.

There is a much greater loss than can be well calculated, when one has, after a fire, to make up a hurried list of the articles burned. The quantity of things forgotten, and not rememberep till afterwards, worry and annoy because they cannot be claimed for or replaced. The thing itself is so simple, and with a little trouble confers such an ease of mind to the insurer, that it cannot but commend itself to all interested parties.

If you have not done it already, set about making an inventory now, and store it in a safe place in case of need.

HYDROQUINONE, FURTHER EXPERIENCES WITH.

By Henry R. Moiser, F. G. S., England, Hon. Sec. Photo. Section, Yorkshire Philosophical Society.

After the publication of my paper on this subject in the "INTERNATIONAL ANNUAL" for 1889, I received numerous inquiries from those who had tried various published formulæ of this developer, and yet had failed to attain success. To these I advised the use of the one solution developer, No. 1 in my paper referred to, and I was subsequetly pleased to find that most of my correspondents were successful, and acknowledged that for simplicity of admixture, facility of application and perfection of result, this developer supplied all requisite conditions. During the whole of last Summer I used hydroquinone to the utter exclusion of pyro, and out

of some hundreds of negatives, prints and lantern transparencies produced by me, I may say that I had not a single failure. Some of my friends complained that their plates were liable to frill at the edges during the hot weather of summer, in consequence of the energetic action of the caustic soda, but as testifying to the exellence of Wratten's "London" plates I state that I have not met with one single instance of frilling in plates of their manufacture. Adaptation of the strength of the developer to the requirements of subjects possessing strong contrasts, or the reverse, is at once obtained by a greater or less addition of water to the developer as compounded, and negatives inclining somewhat to "hardness," suitable for platinotype printing, or characterized by "softness," suitable for printing on aristotype or bromide paper, can be obtained at will, by the simple expedient of greater or less dilution with water.

It is desirable that the solution should not be mixed for any great length of time before it is required for use, as oxidation takes place and the energy of the developer is impaired. I have used the developer after being mixed for six months, but then the action was slow, and the negative or print, deficient in "sparkle," and as a rule I should advise that the developer be used up within one month after preparation.

Latitude of exposure is attainable in an eminent degree, by the use of this agent; and to the less experienced of my brother photographers I would say, give abundant exposure and take plenty of time in development.

To those commencing the pursuit of photography I would strongly recommend the use of hydroquinone as an economical, cleanly and efficient developer. For convenience of reference I append the particular formula referred to.

Hydroquinone 3 gr	cains.
Sulphite of soda24 gr	cains.
Caustic soda 5 gr	ains.
Bromide of potassium ½ gr	ain.
Water1 ou	ince.

PRINTING BATH.

By E. Poole, St. Catherines, Ontario.

A very large amount of thought and care are wisely given to the production of good negatives; the more the better. It would be well if more thought and care were also given to the printing solution. In the past this solution has been the source of trouble to many photographers and to-day many of the fraternity little dream how much sorrow and yet how much joy can be realized from this same printing bath.

A good way; make some carbonate of silver thus: Take some silver solution and add bicarbonate of soda until effervescing has fully ceased. Decant and add water. Decant again and add water, thus washing the sediment, which to some it is necessary to say is the carbonate of silver. Make now a bath of plain nitrate of silver 60 grains strong and add the carbonate of silver. Now rest assured that so long as there remains some of this carbonate of silver in the bath there is little danger of acidity; only be sure there is the carbonate there. The more "sunning" the bath can get the better.

A writer said some two or three years ago that he liked to add a small quantity of a weak solution of permanganate of potash to his bath occasionally before sunning. All right; not a bad thing. It aids the precipitation of organic matter.

A friend quite recently gave me the following: One ounce of bicarbonate of soda, four ounces of water, dissolve. When settled, add about half an ounce to an ordinary plain printing bath, sun it, filter, then add one or two drops of nitric acid; float one and a half to two minutes; fume well. After using, repeat as above stated.

I may add that more sparkling and bright warm tones I never saw.

HOW TO USE FLEXIBLE CELLULOID FILMS.

By Andrew Pringle, England.

As the flexible celluloid films, lately introduced, are being experimentally used by large numbers of photographic workers, as the use of them is certain to become even more general during the season of fine weather supposed to be approaching, and as I have had some little experience of the practical working_of the film, I am led to hope that a few simple remarks will not come amiss from me, to the readers of this Annual.

It is not for me to dwell upon the advantages certain to accrue to the tourist photographer from the use of this film, with its lightness, its compactness, its simplicity and its efficiency; I am more inclined to confine my remarks to its practical working, so that the experience I have gained, may be rendered valuable to those whom I address.

My own opinion has been, ever since the introduction of celluloid films only sufficiently flexible to allow them to be used as cut films, that celluloid in this semi-flexible state would never to any notable extent replace glass plates; with the cut films we have either to carry dark slides, which in ordinary photography on glass constitute the greater part of the weight and bulk, or else we have to use "film carriers" which up to date have been complicated, unsafe, or uncertain in practice. And now that we have a new process with really flexible celluloid, we cannot reasonably expect to jump all at once, into a process perfect in all respects and under every condition. There is, however, no reasonable doubt that in a short time the purely mechanical defects occasionally found in the infant process, will surely and finally be eradicated.

Presuming that the exposures have been made on a roll of this celluloid film, I propose to deal with the special considerations necessary to development, washing, drying, printing and preserving the negatives.

The exposed lengths are cut off with scissors in the usual way and the film will curl inward more or less, according as the cut pieces are near the outside or the inside of the spool. The first thing to do is to immerse each length in a dish of plain water. I immerse the sheets face downwards, taking care to have a good depth of water, say 11/2 inch at least, and to open the sheet up as I immerse it, so that for a second or two anyhow, the water may act upon the emulsion. After this I simply cover the dish and leave the film for a couple of minutes while I mix my developing solution. Having wetted a flat bottom developing dish, I lay the film down on it, beginning at one end and laying the film down as evenly as it will go on the dish. After this the film will be fairly flat, at all events the ends will not jump up. Plenty of developer should be used, and the dish must be kept moving so that the developer is forced to act upon the whole surface immediately the solution is poured upon the film. The dish should be kept in lively motion during the whole term of development. I have developed a good many dozens of exposures, and with pyroammonia or pyro-carbonate I have not yet got an unevenly developed film. I recommend a pyrc-developer for the films as indeed I do for all gelatine bromide films used for portrait or landscape work. The developer formulated in the instructions, or Mr. Wollaston's modification of the formula for stripping films may be used, the only precaution seeming to me necessary being to use a full dose of pyro. My usual developer consists of

Pyro (preserved with sodium sulphite) or
potass. meta bisulphite3 grains.
Liq. ammonia fortiss
Ammonium or potassium bromide1 grain.
Water to1 oz.

The hydroquinone developer is apt to develop unevenly, even glass plates; with a film happening not to lie absolutely flat, the danger is still greater. Still the hydroquinone developer formulated by Messrs. R. W. Thomas & Co. and diluted with an equal bulk of water, answers well for smaller sizes, and if the exposure has been very short, a small quantity of an eikonogen developer may be added with astonishing results. I use Mr. Warnerke's eikonogen formula, which is as follows:

Eikonogen (the latest preparation in crystals)	20	parts
Sodium sulphite	40	"
Caustic potash	20	"
Water	200	66

and if the development requires forcing I add about 1 drachm of this to each ounce of the hydroquinone developer. The above eikonogen developer will in a short time turn as black as ink, at least my batch did so, but used as I have suggested, the discoloration in no way affects a plate or film. It has been stated that an eikonogen developer disintegrates the celluloid film; in my experience nothing of the sort has happened.

It is well to develop these films fully; the thickness of the emulsion film has to be kept down, and if the development were not fully carried out, the negatives might be thin. Using the pyro-ammonia developer as above, I have produced negatives as fine as I have ever seen produced by any process.

I put my developed and washed film, face upwards in the hypo, sliding the film under the surface of the solution; after fixing, I wash each film for a couple of minutes face upwards under a rose tap, then turn the film face downwards and pass a soft squeegee several times over the back, the film lying on a polished sheet of vulcanite or glass. Then I place the batch of films in a good syphon washer for a few hours,

When the hypo is washed out of the film, and after treatment in an acid alum bath if desired, the films are to be pinned by one corner to the edge of a shelf, or pinned by four corners to the face of a door or block of wood. I do not care whether the sheet is pinned by one corner or by four, the great point is not to remove the sheet till it is thoroughly dry. Neither spirits nor glycerine should be used on any account. The dry film will curl up tightly perhaps, but it will curl evenly if treated as I have suggested; it will not "buckle" nor be distorted. All that remains to be done is to roll the batch of films, gelatine side, outwards, and fairly lightly, round a roller of wood or cardboard, and to leave them for, say, twenty-four hours; when the roll is opened up the films will still have a slight tendency to curl, but they can, with complete ease, be laid flat and printed from, in the usual way, and my remarks apply to the largest sizes of the film that are made, viz., whole plate and 10 x 8. I have never had want of contact in printing from a film dried by myself. But if the films are removed from the shelf or door, before they are dry, and specially if they are rolled before dry, they may buckle, and will require to be wetted, dried and rolled again. To preserve the negatives, I lay them flat among the leaves of a rather heavy book,

These manipulations are simple enough "in all conscience."

NOTES ON ENLARGING.

By Henry R. Procter, F. C. S., England.

Since the advent of hand cameras and rapid bromide paper, the subject of enlarging from small negatives has come so much to the front, that, although I have nothing novel to say on the matter, I think it may be of service to sum up in few words, the various methods in use, and their respective failings and advantages.

There are two general methods, under which all others may be grouped, viz.:

- 1. By reproducing an enlarged negative, and printing from it direct in platinum, carbon or silver.
 - 2. By direct enlargement on development paper.

The first of these methods is advantageous where many copies are required, and is the only practicable way by which enlarge-

ments in platinum or carbon can be got without the aid of the solar camera or electric lantern. It also offers great facilities for working up, both in the original and final negatives, and in the transparency, as well as in the finished print, and great control of density, by adjustment of the various exposures and developments. As compared with direct enlargement, it involves thrice copying as against once, and therefore extra cost and labor where few copies are wanted, and more loss of sharpness, other things being equal, and also more or less loss of half tone, from the impossibility pointed out by Abney, of rendering gradation with complete accuracy. Nevertheless it gives first rate results in practiced hands, under favorable conditions, and with suitable negatives having plenty of detail and half tone. The usual professional method is, to make a direct transparency in carbon, which allows of great range of density, and then to make from this an enlarged negative in collodion or gelatine. Excellent results may be similarly obtained, using a good slow gelatine plate for the direct transparency, but in this case it is theoretically better to make an enlarged transparency in the camera, and from this to obtain a negative by direct printing, since in this way the illumination is more equalized, and the defects of the transparency are not magnified. The enlarged transparency may also be used direct, for printing by the powder process, in which case it should be reversed by placing the original negative with its glass side towards the lens. Transparencies may be well made on paper, which is very easy to work up, by anyone used to pencil or water color, of which the former is to be preferred except for broad washes, which can be applied on the back of the paper. illumination of the negative to be copied, may be a piece of ground glass facing an open sky, a large sheet of white paper set so as to reflect the light, and lighted either by daylight, or two lamps, one at each side, so as to exqualize the light, and shaded so as not to shine into the lens, or on the front of the negative. It is obvious that a sigle lamp may also be placed, first at one side and then at the other, or a piece of magnesium ribbon in a similar way.

The second general method, that of enlarging direct on paper [or opals] is one that will usually be preferred by amateurs, and even by professionals where only a few prints are required. By the aid of modern emulsion papers, it can be worked almost as well at night as in the daytime, with any required tone; and

once the apparatus is arranged, with little more trouble than direct development printing; while as only one copying is required, a maximum of sharpness and gradation is obtained.

Direct camera printing may again be divided into two methods, viz.:

- 1. Daylight printing.
- 2. Use of artificial light.

Daylight is the best and easiest where available, and gives most perfect results, both in equality of illumination, and in the power of using the lens well stopped down. The only disadvantage is the variable character of the light, involving frequent trials with small slips of paper. Direct sky light is best, equalized by a sheet of ground glass a short distance behind the negative. This is easiest managed by an enlarging camera, pointed up at an angle, and carrying the negative holder on the same baseboard. Where a darkened room is used with the negative in a hole in the shutter, it is generally easiest to work horizontally, with the paper on an easel or upright stand running on the floor, preferably on guiding rails. In this case any size may be obtained by running the easel back far enough, and an ordinary camera may be used to carry and focus the lens, and to shut out extraneous light, but it will be generally necessary to use a reflector, which must be a good deal larger than the negative to be enlarged, and is preferably a mirror, reflecting the sky, on a ground glass, backing the negative. A sheet of white paper fixed at an angle outside the window, may also be used, but this arrangement gives scarcely sufficient light for focus, unless a portrait lens of large aperture is used and afterwards stopped down. In this case it must be ascertained that the focus of the lens is not altered by the stopping, as is sometimes the case. A piece of ground glass, lighted by direct sunlight gives fine illumination but varies rapidly in intensity.

The use of artificial light makes evening and Winter work possible; and may give as good results as daylight when very carefully arranged, while the uniformity of the light makes the calculation of exposures much easier. Either a lantern and easel, or an enlarging camera may be used; the latter is limited to moderate sizes and is not easily applicable to printing in clouds etc., but otherwise is very convenient. No rack or other fine focusing arrangement is needed, but the final focus must be got by moving the focusing screen and not the lens. In the case of

a lantern, either the easel or the lantern itself may be moved, unless the enlargement is considerable, when focusing may be done as usual with the lens rack. The optical reason of this is that from the laws of conjugate foci, there is, with any given lens and scale of enlargement, only one particular distance and no other between the negative and the image, and if this distance does not happen to be right, no moving of the lens will bring the picture into focus.

As regards the source of light, petroleum is handy, and very suitable for large portraits where a little vagueness is useful for softening, but scarcely capable of producing high class definition, because the use of a small stop makes exposure very tedious, and often produces inequality of illumination, by bringing out the imperfect correction of the condensers for spherical abberation. A round wick, or flat wicks with their broad side to the condensers give more even illumination than double or triple wicks edgewise. A piece of ground glass between the flame and the condensers and as near the former as practicable will equalize illumination with less loss of light than if placed between the condensers and the negative, and hence will allow of the use of a small stop. The lime light is good, and with compressed oxygen, convenient. Magnesium ribbon is also handy and excellent, but some device such as a spiral wire covered with calico should be provided to carry the smoke to the chimney. Now that the ribbon is so cheap, condensers are not neccessary, as quite as even an illumination can be obtained by moving the light about at a little distance behind a sheet of ground glass, placed an inch behind the negative and rather larger. It is easy to cut a bit of tin so as to form at once a reflector and a clip for the ribbon

If condensers are used, the distance of the light from them should be such as to bring it to a focus on the stop of the lens. It is often stated that small discs of light, such as the lime light, give better definition than broad flames; and this is undoubtedly the case when portrait lens is used with open aperture, since the image of the light thrown into the lens is equivalent to a stop, but does not show up the imperfections of the condenser.

The negative holder should have horizontal and vertical, or

The negative holder should have horizontal and vertical, or still better, universal movement, and a firm clamping device. The negatives should be capable of being replaced in the holder in exact register for cloud and double printing. Distortion of vertical lines due to the want of perpendicularity of the camera back in taking the negative, may be corrected by a swing back motion of the negative in copying; a small stop being of course used to correct focus. Barrel shape distortion may be largely corrected by using the same lens in copying, as in taking the original. Exposure varies extremely with the character of the negative, and can only be got by experience or trial. It should be noted for each negative when once found, as, other things being unaltered, it merely varies in proportion to the area of the enlargement, or in other words to the square of its diameter. Thin and detailed negatives give the best results.

I had intended to touch on development, but my remarks have already been too long, and must lie over till another year, when perhaps we may be able to form a more definite judgment as to the respective merits of ferrous oxalate, hydroquinone, and eikonogen.

PHOTOMICROGRAPHY VERSUS DRAWING IN THE DE-LINEATION OF MICROSCOPIC OBJECTS.

By George W. Rafter, Rochester, N. Y.

At the conclusion of Volume II. of Cole's Studies in Microscopical Science there is found a short chapter on Microscopical Drawing and Painting, by Mr. Edward T. Draper, the author of the elegant series of drawings illustrating that volume. Mr. Draper is disposed to say, and does so say in effect, that photography cannot compete in completeness and perfection of delineation with the "work produced by a hand guided by cultivated observation." I cannot but think, however, even though the skillful drawings which Mr. Draper has contributed to the volume in question are the very highest evidences of the possibilities of hand delincation, that his views, as expressed in the little essay in question, are essentially wrong. Certainly his objection that by reason of lack of coincidence of the chemical and visual foci of microscope objectives a delicate manipulation is entailed which never touches perfect precision is, in the present condition of microscopical optics, fundamentally incorrect. The apochromatic objectives give absolutely the same photographic image as that seen upon the screen, and this, too, with a brilliancy, when properly timed exposures are made, to which no drawing, however skillfully delineated, can ever hope even to approximate. In justice to Mr. Draper, however, it must be observed that the

chapter in question was written in 1884, before the apochromatics were brought out, and there was a slight measure of justness in his observation as applied to the ordinary achromatic objectives: but at the present time, with the apochromatics in common use among photomicrographers, there is no further merit in this particular objection.

Possibly it may seem, to some readers of THE INTERNATIONAL ANNUAL, somewhat in the nature of ancient history to take up, at this apparently late day, the discussion of a question, which, at first sight, would, so far as the illustrative example which I have drawn upon, appear to have been more appropriately discussed, say five years ago. My reasons, however, for selecting this example are twofold: (1) The drawings of Mr. Draper are of the very highest character, and have worthily received the commendation of all who are capable of judging; (2) the fallacy of Mr. Draper is one quite common, at any rate in this country (the United States), and I suspect, from the frequent references to the subject in the various foreign microscopical journals, that microscopists abroad are not yet entirely a unit on this question. It may, therefore, I conclude, be considered as essentially a living question, possibly ancient only as to the illustrative example which I have used.

Mr. Draper further urges, in favor of the superiority of drawings, that the draughtsman may, by the use of the fine adjustment, feel his way into super-imposed planes and embody in the drawing the sum of all his impressions. If it were possible to insure in the skillful draughtsman absolute freedom from errors in the use of the imaginative faculty, there is no doubt but that the exactitude necessary for truthful delineation of minute structure would be more frequently obtained in drawings; but as a matter of common observation, in new studies the tendency to delineate a theory frequently destroys the value of the drawing as a record embodying scientific precision.

In photography it is equally necessary that the operator be fully informed as to what is required to be photographed, but the advantage of the method lies in this, that the thing photographed once can be easily photographed again, while cases are not wanting of drawings used to illustrate a new discovery, which no one could ever exactly duplicate except the author himself.

Ten years ago the reputation of leading the world in photo-

micrography rested clearly with the United States. Dr. Wood-

ward's work at the Army and Medical Museum in Washington had given us fairly that advantage. At the present time, however, we must go to Germany for the best examples of recent work, and I may cite Frænkel and Pfeiffer's Atlas der Bakterienkunde as containing on the whole the finest illustrations of the possibilities of photography applied to microscopy that have ever appeared. The difficult nature of the objects photographed and the high magnifications which they have successfully used on these objects serve to render the photomicrographs in question, as a series, unique and forcible illustrations of the value of photography as an aid in the precise delineation of microscopic objects.

PRINTING ON MATT SURFACE PAPER.

By T. C. Roche, New York.

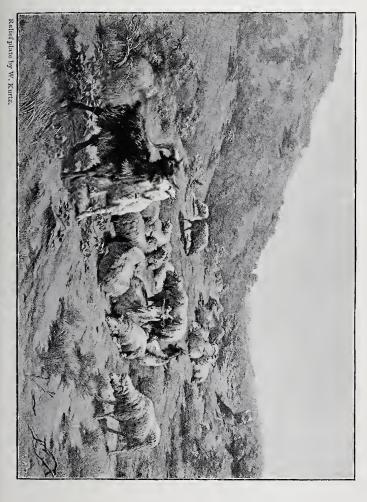
Use heavy Steinbach or Rives plain paper and make the following sizeing:

Water 40 ounces.	
Simeon's gelatine320 grains.	
White sugar120 grains.	
Chloride of ammonium100 grains.	

When the gelatine is well soaked, dissolve in a hot water bath, then add one or one and a half drachms of sulphate of barium to the solution and shake well. Now add ten grains of chrome alum, which you have dissolved in a little hot water. The mixture is filtered through coarse flannel into a clean dish, which must be placed in a larger size zinc dish holding some hot water to keep the solution warm. The paper is immersed in the solution, face down (back of paper should be marked previously) and if any bubbles show on back, they should be removed with a brush before any more is immersed. Several sheets can be immersed; then turn all over, face up. Four to five minutes in the solution will be plenty of time. Each sheet is removed singly and hung up to dry with clips. To sensitize, float the paper on an ammonia nitrate of silver bath 50 grains strong, from sixty to ninety seconds. When dry, it is ready for printing. It requires no fuming, but fuming will do no harm.

AMMONIA NITRATE BATH.

Water	20 oz.
Nitrate of silver1	,000 grains,





When dissolved, take five ounces of the above and add to it, with constant stirring, strong liquid ammonia until the precipitate first formed is dissolved. Now add this to the remaining silver solution and filter before use. This solution should be kept from strong white light. Any good toning bath will work with this paper. Unless the negatives are strong and brilliant, the paper should be printed in the shade. With a good negative there is no trouble in getting purple black tones. The proofs are washed previous to toning and fixed in the usual hyposulphite of soda bath and then well washed. Pictures made as above twenty-five years ago are still perfect.

THE HAND CAMERA AND ITS DEFECTS.

By Harold Sands, England.

To attempt to display the defects which form the salient features in all the detective, or should I say defective, hand cameras now on the market, would be a task of such a length that even an encyclopædia would scarcely suffice, while to find them out by actual working would require the allotted span to be extended to that of a second Methuselah. In approaching the subject, I propose to mention only some of the higher class hand cameras, and not of toys like the smallest size Kodak, Vest camera, or the various cheap and nasty ones, waiting their unsuspecting victims, in the shape of intending purchasers. No one will dispute the axiom that all hand cameras have defects. this I append the rider, that such are seldom discovered till the camera has been tested by actual working. Now I shall pass in review some of the notable good points in some of the cheaper makes which deserve to be incorporated in the better class instruments. Take the smallest sized Kodak. The makers have in it, enunciated a formula which ought to form the keynote of every kind of hand camera on the footstool, namely, Three movements suffice for everything. The outward appearance is not calculated to alarm the most suspicious, the manipulation is simplicitly itself, and the weight item has been largely eliminated. As a camera, it has only one fault, but that is a grave onethere is no power of focussing; hence, no certainty of getting a perfectly sharp picture, which when taken, as most of its pictures are, with a view to subsequent enlargement, is a serious

defect. I have seen some hundreds, I may say thousands of Kodak pictures, but I have never yet seen a perfectly sharp picture, and the reason is not far to seek. Machine made as an article of commerce, not a scientific instrument as there is no focussing adjustment, all the parts being made to gauge and measure are assembled together, and there is no scope for so fixing the roll holder in its case, so the image projected on the film is the sharpest possible to be obtained. As it is, the makers are content with an approximate sharpness, which is often a cause of disappointment to the purchasers. If there is any doubt of the truth of this fact, a glance at the "for sale" columns of the photographic journals would suffice to dispel it. Then again, the picture is too small, and the shape is unbecoming and unfit for pictures of almost every kind, and there is no finder. All the above defects have in the most praiseworthy manner been remedied in the larger size Kodaks they are now introducing. Now, a secret camera on the Vest camera principle, to give three-inch circular pictures could be easily made by any amateur possessed of a little mechanical ingenuity—only the size would be rather against It might be worked out in cardboard and then built up in tin or zinc. Now celluloid films are fairly on the market, it would not need to be thicker than the present larger size instrument, and could be made to carry films back to back, on the revolving inner plate, and the lens with its cone to take off, and fit on the other side, thus enabling a double number of exposures to be made. The diameter would be slightly increased, and the lens and its cone would be larger in proportion. Now one of the good, cheap forms is the Blair camera, sold by S. Frey & Co. It is very light, and the plate holders are of a type that only require testing to ensure it widespread popularity. Abraham's first form of hand camera, which is unique in its interior construction, has the best device for rapid change of plates, of probably any camera now on the market, but the power of carrying and exposing a large number of films or plates is not the be-all and end-all of photography with a hand camera. By the stress which is usually laid on this power of carrying and making a maximum of exposures with a minimum (in most cases) of valuable results, it would appear to the thinking mind that nearly all hand cameras must have been designed by individuals interested in the manufacture and sale of dry plates, with a view to pushing business. But as yet I have not seen any particularly good results obtained with the Abraham camera, which seems worthy of note, having in view the extra fine specimens shown by other makers.

Rouch's have designed an excellent little quarter plate camera with changing bag attachment, which does very good work, but if you go out and leave the wind up key to the shutter at home, the result is profanity, but not pictures. Thistleton, McKellen, Beck, Watson, and the Platinotype Company, have excellent instruments, but there are points in all of them capable of improvement, and in a few years they will become obsolete. Eclipse hand camera is an excellent instrument, and is well adapted for surreptitious conveyance into places where photography is forbidden, e. g., the Tower of London, though I do not recommend any of my readers to try it on unless they wish to experience the pleasures of a lengthy detention in that classic spot. Now one point that seems to be totally ignored in connection with hand cameras, is their fitness for the purpose to which their purchasers intend to apply them. We do not usually employ an elephant rifle to shoot wild ducks, nor a fowling piece to kill big game; yet the use of hand cameras upon the varied range of subjects for which they are used is perhaps as reasonable as the aforesaid converse use of guns would be. Now it is requisite to have a elear notion as to the line you intend to follow, then if you are fortunate enough to have tools and the knowledge of using them, design a camera suited for that class of work, and you will be more likely to obtain the best results than by using an all round camera which is to be used for everything that comes along. If you are not "apt in machination," as the foreigner said, then jot down your ideas with rough sketches, and get some small camera maker to carry them out for you. Now the prominent features of a good hand camera should be, ability to use long or short focus lenses, to carry twelve exposures in double backs, roll holders, or magazine changing devices, it matters not; ability to use on a stand as an ordinary camera without removing it from the case; small bulk for portability, light weight so far as consistent with strength, power to focus on ground glass, as in ordinary cameras, exterior free from growths of knobs, and similar excrescences that people may not suspect you of carrying a disguised infernal machine; when all the above are embodied in a hand camera, the golden age will have arrived, and camera makers will have nothing left to live for. The shutter I do not mention here, as there are plenty of good ones, and each individual has

his pet one, which if you deride induces him to set you down as a fool from whom nothing is to be learned. Now the mechanism for operating everything ought to be underneath, so that it is needless to have to open box except to draw out slide shutters. Thistleton comes as near perfection on this point as is possible, for he has concentrated all the motions in a recessed bottom in a truly admirable manner. It has been said, and by some who ought to have known better, that "there is no advantage for legitimate work in concealing the hand camera in a box." This is prima facie absurd. I would admire to see any man carrying a hand camera not so enclosed, and using it without a stand in any large town, but say in particular on an omnibus or a river steamer, say in London or New York. A few remarks on what is legitimate work for the hand camera may fitly be included here, as Chas. J. Leland says, "Est modus in Rebus." There is a limit to the pictures that ought to be taken, and for it the only true rule must be one's own feeling of what is proper to be taken; a safe maxim is, never take a picture where you feel you would not wish to be the subject of a similar one. I regard the placing the power of making a number of rapid exposures with a hand camera, in ignorant and unthinking hands to be a positive source of evil, and calculated to damage photography by making it a nuisance to outsiders who are in most cases sufficiently unsympathetic without being rendered absolutely antagonistic; the hand camera was not and is not intended for snooping, which as the author of that immortal work defineth it, is the going about and sticking one's nose (and in this case one's camera also) into all kinds of places where it has no business to be. Then again, if the camera is to be so constructed as to avoid the undue attention of the "profanum vulgus," and I here say it must be, what better form is there than a box? which in some cases may be utilized to form the very body of the camera itself, and is besides useful for the attaching to, and combining in one harmonious whole, of finders, focussing gear, plate changing devices, shutter, etc. I may remark, en passant, that there is no more stupid and conservative body of men on this earth than the makers of cameras. Shiny brass and French polished mahogany was good enough for their fathers, is for them, and will be for their sons. Now can anything more idiotically contrived to attract attention be conceived, than the lavish use of the above? When purchasers have the sense to revolt, they will demand that brass work be black and dull, and woodwork be stained black and varnished with a dull surface like the excellent double backs made by the Sciopticon Company of London. I for one shall hail the advent of the common sense camera of the future, constructed in accordance with this idea; a modern camera for outdoor work, be it hand or ordinary, is not a piece of furniture for the drawing room, and all this high polished and gaily lacquered brass, though attractive to the ignorant, does not render the camera a jot more efficient; the shiny leather case in which so many hand cameras are enclosed, is now beginning to be known for what it is. Only last Summer I heard a London gamin say to another on the embankment, "Hi, Bill, here comes one o' them fellows with a camera." I looked up, and beheld approaching a man with a leather cased socalled detective camera, which in this instance had led to his detection; people will say, Oh, but leather acts as a buffer and saves the woodwork hard knocks; to this I reply, I use an ordinary light pine wood box, with ash battens about three-eighths of an inch thick by one inch wide, screwed on sides, ends, top and bottom, the box simply painted black, and after knocking about for over a year, the paint is hardly scratched, except on the battens. I have no belief in the fixed focus lens theory, though good work has been, and will be done by cameras embodying that principle. It is as opposed to common sense to say that one lens of one focus will do for everything, as that one camera can be adapted to all purposes; still with reference to what I shall say as to the use of more than one lens on a hand camera, I do not regard it as essential, when finders can be had so small as one inch square in metal. No hand camera is perfect without one, and all of them ought to be adapted for fitting on a tripod for landscape work and architectural interiors. Now the size of plate to be worked is the first consideration, for if you are intending only to enlarge the negatives it does not much matter, but for lantern slide work, a 5x4 camera is better than 1/4 plate, as a little holding askew in the smaller size, may spoil the picture; whereas in 5x4 you have more chance of getting all you want on the plate well balanced as regards proportion of sky to foreground. I see no reason why hand cameras are to be made in small sizes only; eventually they will be made up to 10x8 plate size for taking large direct pictures, and much credit is due to Mr. Shew to have led the way with his 81/x61/2 eclipse hand camera, and so set an example which I hope to see numerously followed.

All hand cameras at present constructed, are defective in some of these four points.

A—Rapid means of changing lenses without interfering with shutter.

B—A means of using as ordinary camera on a stand and focusing on ground glass in usual way when used for portraits or architectural subjects.

C—A large finder to give objects same size as on plate, for if many things were seen actual size first, they would not be exposed on, small finders giving very deceptive images.

D-A magnifying focussing gear, if I may so term it, in which by means of levers, the actual movement of the camera in focussing, is multiplied about three to one on an index plate. This I regard as most important, as by actually testing a camera so fitted by focussing on objects fixed at various measured distances from the lens, you can graduate the index plate, going by intervals of fifteen feet, from five to 150 feet, and beyond that all is sharp enough, and by moving the reviser on this index plate and locking the camera to prevent movement, you can focus for any distance that can be estimated by the eye. Now I am no friend to roller slides and magazine plate holders, they are apt to lead to the indiscriminate exposure of plates on all that comes along, because there are a lot of exposures in store, therefore I prefer double backs, and while I can get them made quarter plate size half an ounce in weight, and 5x4 plate size 3/4 ounce, I shall go on using them and to recommend others to do so. These slides are those I have already mentioned as being made by the Sciopticon Company. Hand cameras were not sent us merely to expose vast quanities of negatives with, but for reproducing scenes either where the ordinary camera is useless or inaccessible or of getting pictures containing moving objects while the camera is itself in motion, e. g., photography from bus, boat, tram, or train; so seldom is it that exposures are needed in very rapid succession that there is usually ample time to reverse the double back if a rapid disengaging gear is fitted.

Now for the lenses on a 5x4 camera, one should be able to use 5x4 and 6½x4¾ rapid, and portable symmetrical lenses, and a whole plate rapid symmetrical for long distance work at sea, to suppose that one lens will do for all sorts of work is ridiculous, and to recommend the use of short focus lenses, except for architecture, such as street views, in confined situations, is equally so,

as such lenses give untrue pictures; whereas for general work, a medium focus lens of the rapid symmetrical pattern is best, but in this matter each man must be a law unto himself, and no one can lay down a hard and fast rule which will suit the requirements of all. For marine work, ships at sea, yacht races, river scenes, one must employ a long focus rapid lens of narrow angle, for such subjects would be incorrectly rendered by a short focus wide angle lens, and would seldom be worth taking; and another use of long focus lenses is the taking of street groups from a distance, when they seldom notice what you are about, and their attitudes are natural and unconstrained, whereas by going close up their attention would certainly be attracted. Of shutters, the name is legion, and each is of course the best. For my own part, for all ordinary work, a shutter of the Kershaw roller blind type, is my favorite, working in front of lens and for this reason : when working at sea or taking breaking waves in rough weather the blind protects the lens from spray and mist till the instant of exposure, while for very rapid work a double blind shutter as made by Thornton, Pickard of Manchester, and as recommended in last year's Annual by Mr. Paul Lange, where several lenses are used, the shutter may fit the largest, and wood rings may be turned and slipped on over the bodies of the other lenses to enable them to fit into the shutter and prevent light leakage.

The elimination of weight, as far as is consistent with strength, is a point which ought more than it does at present, to engage the attention of hand camera constructors. Wood may be replaced by sheet vulcanite with brass bindings for strength (as it is rather given to cracking); conical bellows are preferable to sliding boxes for the body of the camera, and it is a moot point whether to move the front or back when focussing, but so long as there is ample bearing surface and a good lock fast attachment, it matters little; a noting tablet of opal glass or celluloid for noting down exposures is a useful adjunct, and if double backs are used there should be means of carrying them in the lid of the enclosing box without interfering with the working of the camera. In my own practice I use a 5x4 long focus, bellows camera, with reversing and double swing back of Perken & Rayments, make, enclosed in wood box; it is fitted with three lenses, six double backs, the finders two inches square, shutter focussing screen, eye piece, and a tripod top; all are included in a box 12x10x8 inches, which with a light Anthony's fairy tripod stand strapped to lid, weighs

under fourteen pounds, and had I built a special camera instead of adapting one I had by me, I doubt not but that considerable reduction in weight could have been effected. The camera focusses, on a graduated index plate, marked by myself from measured distances, is held under arm when exposing and is available for all kinds of work without removing from its case. In conclusion. I should say to all who have patience to read this, get a hand camera and you will have much pleasure in using it, specially if of your own design, for those who don't want reducing to the verge of insanity, by having a hand camera plastered with all the latest movements, levels, fads, and swings, I say get a fallowfield's facile, fitted with as big a finder as possible, and you wont regret it, for they are the simplest and easiest to work of any camera I know, and the least likely to get out of order. In conclusion, I hope the remarks I have made may induce many who have abandoned photography as a fag to take it up again with a hand camera.

STRANGE ADVENTURES OF A CAMERA IN RURAL ENGLAND.

By Miss Adelaide Skeel, Newburgh, N. Y.

"Americans are so droll, don't you know?" we heard whispered at every garden party. Nobody guessing our noisy patriotism could be anything but a joke.

"I say!" began the good vicar at whose house we were stopping, "you must go ahead as you always do or Lady Maud and her sisters will be disappointed,"

"She shall have the worth of her money," I said, while my companion added:

"We will act as if we belonged to Buffalo Bill's Wild West Show," and then, without more words, we packed our holders, which our generous host had already filled from his own dark room closet with the excellent Sefera plates, the nearest the British can approach to our incomparable Carbutts'. Photography seems to be the serious work of the rural clergy over here, though, I believe, only rectors with fat livings go into it largely; the poor curates of necessity being obliged to wait for disestablishment and larger salaries.

The Vicar of ----- had been particularly successful in platinotypes, and showed us soft copies of old paintings which rivaled the most delicate etchings in outline and half tone. The copying of family portraits was his specialty, but we had no time to spare for such reproduction, with the beauties of nature at first hand before our enchanted gaze. Consequently we gladly left him at work before a tarnished gilt frame, to seat ourselves in the Countess' double pony carriage, opposite Ladies Maud and Adelaide, the latter commonly known as the child. We treated the latter to much kittenish nonsense. Knowing little girls of forty or fifty are no uncommon development in England, but showed all deference to the elder sister. Both were handsome. decorative, high colored, well shaped, small waisted women with wide smooth brows, regular features, carnivorous looking white teeth and silky black hair. I am afraid to focus more sharply lest by bringing out too clear detail the portraits will be recognized and the Annual sued for damages. Trusting, however, that it may not be read from cover to cover, in houses where the book of the Peerage is the British Bible, I venture to add that we found our hostesses kind but rather dull. English girls are said to be very slow or very fast, and these gentlewomen could never be accused of the latter fault. In fact I think a sensitometer would rate them below the blue labeled number, sixteen degrees of rapidity. Doutbtless, under different circumstances they would have appeared brighter, but we, despite our gratitude for their condescension, were too bent on seeing and taking, to find out their sympathetic responsive sides.

Laden with all my traps, I stumbled into the phaeton without waiting for Jeames, the footman, while Isabella proved herself equally American by actually assisting that buttoned attendant to place her outfit in the boot behind,

The vicarage itself is so picturesque a house, built long ago in the fifteenth century, that I suggested we take it while the



light was right, rather than wait our return, hence before we started. we stopped and secured the view (Fig. 1) given below. The thatched roof and small diamond paned windows made a charming background for the vicar and his wife, who kindly consented to pose beneath the ivy covered porch.

"It is the very essence of English country life," I said, delighted with the composition.

"It should be used to illustrate a prayer book," said Isabella.

"Oh," said Lady Maud.

"Ah," said the child.

Making a fresh start we drove down the long beech avenue towards the lodge, but before we had passed the high iron gates or graciously received the low courtesies of sundry small bobbers,

we begged to be allowed to stop a second time. Here it was no easy task to decide on length of exposure in this flickering shade, but guessing like true Yankees we got this result (Fig. 2), which might be better and might be worse.

"You admire our old trees, I see," said Lady Maud. "I presume your wide empty prairies look very different, do they not?"



Fig. 2.

"I never saw a prairie," I answered shamefacedly, adding, by

way of apology, "we don't grow them on the Hudson River,"

"Fancy!" said the child. Then we drove on in disgrace through a deep cut lane, whose high banks reached above the footman's tall hat.

"Please let us get this," said Isabella, breathlessly, so we stopped a third time to find

the question of exposure more difficult than in the beech avenue (Fig. 3). Photography has its limitations, and I believe we shall never succeed till we learn to develop different parts of the plate in special ways for sun and shade. Why can't we spot the



Fig. 3.

high light with a retarder and bring up the detail with an accelerator?

Naturally we hesitated to trouble our high born companions with posing, so I placed Isabella midway in the road, to show by contrast the height of the gorse covered banks. Two men and a dog added themselves to the group with fine effect, since Isabella's pose suggested nothing less than a recitation of the Declaration of Independence.

At the end of the lane we came upon a characteristic English village, its thatch roofed cottages compactly crowded together as if there was not an inch of ground to be wasted on all John Bull's island. Some school children stared at us from across the road, and we did not wait to think twice before we made ready to get them all in our picture.

"This village is next to Honiton where the lace is made," said Lady Adelaide, "would you care to stop. Some old women do it here very tidily, and will be pleased to show you their pins and cushions. It is not our day to visit, but perhaps mamma would not mind, do you think, sister, if"—

"Better not break over our usual rules, child," said Lady Maud. "I think the ladies will enjoy taking their machines into the churchyard and getting a view of the church. It has been twice restored, but is still considered by antiquarians to be a good example of Norman work."

We were not at all sure we did prefer to use up a plate on this singularly ugly edifice, but not daring to refuse, we took it against a cloudy sky, tombstones, tower, north aisle, Ladies Maud and Adelaide, grave digger and a stray curate, all thrown in without extra charge. We could not pass by a lace maker's



small child posed for us in the doorway, greater sobriety could not be asked (Fig. 5). This was our last plate and best picture, all the conditions of light and shade being eminently satisfactory. The white stucco house illuminated the blooming garden with an accessory glow, while

house, however, where an old woman happened to be washing in a stone trough at the door, while a child hid bashfully behind a pump handle. The deaf grandmother nodded at us so incessantly that her image is somewhat blurred (Fig. 4); but when the



Fig. 5.

the granddaughter's apron reflected brightness on her rosy face.

"Now," said Lady Maud, "we will begin our drive that you may take views of rural England to carry to your far Western home."

"Begin to take views?" I repeated, in surprise.

"Yes, we have not driven a mile from home and have shown you nothing," she responded, smiling blandly.

"We are three thousand miles from home, don't you know?" faltered Isabella, taking refuge in the popular idiom.

"But you have seen nothing foreign; this is our every day life," said the child, venturing to advise her elders.

"There is no foreign land, it is the traveler only who is foreign," I quoted, and, then, anxious to show I was as familiar with English phrases as Isabella, added, "and we are travellers, don't you know, fancy, thanks awfully, not half bad, very pleased, I say!"

"We have no more plates, my Lady," said Isabella, in a very

small voice which seemed to bob innumerable courtesies in its trembling tones.

"Drive back to the Vicarage, Jeames," was the order presently given, and thus before they had fairly begun, the strange adventures of a camera were ended, but I heard Lady Adelaide exclaim after we had parted from her:

"Americans are so droll, don't you know."

Of course the child's answer was as usual:

"Fancy!"

EIKONOGEN, ITS CONSTITUTION AND PREPARATION.

By James H. Stebbins, Jr., S. B.; M. S., E. C. S., President,

Society of Amateur Photographers of New York.

Eikonogen has of late become so widely known as a developer, that it may be of interest to look into the chemistry of this interesting compound.

In 1880 Raphael Meldola, while studying the action of nitrosocompounds on phenols, discovered a nitroso-sulphonic acid of beta naphthol which at that time was the first known representative of the class of aromatic nitroso-sulphonic acids (Journ. Chem. Soc., Trans. 1881, p. 40). Of the seven possible isomeric monosulpho-acids of beta naphthol, only one interests us, viz.: the modification first discovered in 1869 by Schaeffer, and which is best prepared by heating one part of beta naphthol with two parts of strong sulphuric acid to 100° C. till the beta naphthol is completely sulphonated. Certain other sulphonic acids are produced at the same time, but the chief product of the reaction is Schaeffer's monosulpho acid, and it is the latter product which vields the nitroso-compound under consideration. In order to prepare the latter, the soda or other salt of the nitroso-acid is dissolved in cold water, together with the required amount of nitrite of soda, and then, while keeping the solution well cooled, gradually add hydrochloric acid to acid reaction. The nitroso sulphonic acid is at once formed and remains in solution; but the acid can, if necessary, be isolated in a state of purity by means of its barium salt (Journ. Chem. Soc., Trans. 1881, p. 44).

Aromatic nitroso-compounds, when treated with reducing agents, are converted into the corresponding amido-compounds,

and it was in utilizing this reaction that Meldola obtained the first amido sulphonic acid of beta naphthol ever known, which, when converted into its soda salt, constitutes the compound now used so extensively, and known by the name of Eikonogen. Some months after the publication of the results obtained by Meldola, P. Griess discovered an amido-β-naphthol mono-sulpho acid, which is no doubt identical with the one described by He obtained it by reducing the diazo-compound obtained by the action of meta diazobenzoic acid upon Schaeffer's sulpho acid of beta naphthol. Since then, O. N. Witt (Ber d. Deut, Chem., Gesell, 1888, pp. 3468 and 3469) has made a thorough investigation of the subject, confirming Meldola's views, and has likewise succeeded in obtaining the three other isomeric amido sulphonic acids corresponding with the three beta naphthol mono sulphonic acids, discovered since the date of Meldola's investigations. Witt's amido sulphonic acids were all prepared by the reduction of the azo derivatives of the several beta naphthol mono sulphonic acids by means of a solution of stannous chloride in hydrochloric acid. The amido acids known at the present time are, therefore:

- Amido-beta-naphthol-beta-sulphonic acid (Eikonogen is the soda salt of this acid). From Schaeffer's acid.
- Amido-beta-naphthol-alpha-sulphonic acid, from Bayer's acid.
- 3. Amido- β -naphthol- δ -sulphonic acid, from Casella's F-sulphonic acid.
- 4. Amido-β-naphthol-γ-sulpho acid, from Dahl's acid,

Acid 1, on account of the ease with which it is oxidized, is the best adapted as a developer.

The constitution of the amido-β-naphthol-β-sulphonic acid is dependent upon the constitution of Schaeffer's acids; recent investigations, however, indicate that the constitution of this

and as it is well known that in compounds which furnish both azo and nitroso-derivatives, the azo-group and the nitroso-group will occupy the same position in the aromatic ring, consequently in Schaeffer's acid, the most readily replaceable hydrogen atom, is unquestionably the α (ortho) atom, with reference to the

hydroxyl (O H), and therefore the constitution of eikonogen is

best represented by the formula $$_{\rm H~S~O_3}$$

As already stated, eikonogen may be either made by the reduction of the nitroso-sulphonic acid or of an azo-derivative of Schaeffer's acid. Thus, for example, when beta-naphthol- β -sulpho acid is treated with a molecule of diazo benzole-chloride in an alkaline solution, an orange coloring matter is obtained, viz.:

$$C_6$$
 H_5 $N=N$ $Cl+\beta$ C_{10} H_6 $(Na S O_3)$ O $Na+Na OH=C_6$ H_5 $N=N-\beta$ C_{10} H_5 $(Na S O_3)$ O $Na+Na$ $Cl+H_2$ O .

On now treating this orange coloring matter with a reducing agent, say stannous chloride in hydrochloric acid, the azo-group is split in twain, and two hydrogen atoms are added to each free nitrogen atom, thus forming aniline, and amido- β -naphthol- β -sulpho acid, viz.:

Although the above method is practicable on a small scale, yet when it comes to preparing eikonogen on a large scale, I fear that it would be too expensive. If, however, instead of using the azo derivative of Schaeffer's acid, we employ the nitroso-derivative of the same, the process will be materially cheapened, as all that will be necessary is to treat a solution of Schaeffer's acid (as already described) with nitrite of soda and hydrochloric acid, after which the nitroso-compound may be immediately reduced, without being isolated, by means of some cheap reducing agent, as, for example, zinc dust. The reaction taking place in this case is as follows:

$$\beta \, C_{10} \, H_5 \! \left< \! \! \begin{array}{l} \!\! N \, \bar{O} \\ \!\! O \, H + \!\! H_4 \! = \! \beta \, C_{10} \, H_5 \, (H \, S \, O_3) \! \! \right< \! \! \! \left< \! \! \begin{array}{l} \!\! N \, H_2 \\ \!\! O \, H \! \end{array} \! \! + \!\! H_2 \, O. \!\! \right.$$

After the amido acid is thus formed it is converted into its soda salt, by treating it with the theoretical amount of caustic soda, or carbonate of soda; but as the soda salt of the amido-acid is very easily oxidized when exposed to the air, the treatment with soda should only take place in the presence of sulphite of soda, or free sulphurous acid, which will protect it from the action

of the oxygen of the air, after which it is allowed to crystallize.

As the Schaeffer acid is practically a waste product in the preparation of some of the other isomeric sulpho acids of beta naphthole, the cost of manufacturing eikonogen should be very low; but owing to patent rights, etc., it is retailed to the photographic fraternity at a pretty high price. The time will, however, come when the price will probably be reduced considerably below what it now sells at.

Eikonogen is by far the most powerful developing agent yet presented to the public, and it bids fair, I think, in time to supplant all the other older and well known developers heretofore used.

THE EYES IN PORTRAITURE.

By Frank M. Sutcliffe, Whitby, England.

If it be true that the eye is the window of the soul, that member should have our fullest attention in our attempts at photographic portraiture. How often, however, do we find, that everything has had more attention given to it than the eye, but owing to the want of care and thought in dealing with the sitter's optics, much of the labor spent in aiming for a natural picture is lost. What is the use, we venture to ask, of choosing the most suitable background and of using all our skill in trying to make our sitter feel and appear at home, if we allow his eyes to look as they never do except when he is under our treatment? Many photographers seem to think that it is the fact of having to keep still for a few seconds, that makes the sitting for a portrait such a terrible ordeal to their patients, but if they notice, they will find that until the sitter is asked to fix his eyes on a certain object, his expression is natural, no matter how long he may have been sitting still. This being so, we should try to keep this expression during the exposure, and we think that the fault lies more with the photographer's everlasting desire for sharpness everywhere, than the sitter's fear of spoiling the picture by moving his eyes, for even if the operator gives the sitter permission to blink, he too often directs the gaze of the subject to some tiny object or spot which cannot be seen without straining the eyes. To those who notice a fixed look

about their sitters' portraits, we would say, try substituting a good sized picture in place of the speck on the wall or tiny carte that you have been in the habit of asking your sitters to admire, and you will be surprised to find, not only no loss of sharpness in the pupil of the eyes, but an entire absence of that gazing at nothing, which too often stamps the work of the photographic portraitist as lifeless and unnatural. The photographer should, of course, see that the pictures he uses are not too light or surrounded with white mounts.

WHERE TO GO WITH THE CAMERA IN SOUTHERN CALIFORNIA.

By Geo. Tashiera, Pacific Coast Amateur Photographic Association, San Francisco.

Distance and the heavy cost of travel do not permit of the southern part of this State becoming a common destination for amateurs desiring a brief photographic "outing," but to those who are fortunate enough to be able to disregard these difficulties, a few suggestions may prove of value.

The trip to San Diego can be made either by the steamers of the Pacific Coast Steamship Company, leaving San Francisco about every ten days, or by the Southern Pacific Rallroad. Probably the best plan is to go down by water and return overland.

The principal object of interest in the neighborhood of San Diego, is the old Mission Church, situated about eight miles from the city, and reached only by private conveyance. The building is fast going to decay, in fact is a ruin at the present time; but it is particularly interesting as being one of the old stone and adobe edifices belonging to the period of the early Spanish missionaries. In a few more years, time and neglect will have quite swept away these picturesque structures, and amateurs wishing to secure negatives of them should lose no opportunity of visiting them with their cameras.

Another good subject near San Diego, is the monument marking the boundary line between California and the Mexican territory of Lower California. It is from sixteen to eighteen miles distant, over a very good carriage road, and the novelty of the subject makes it deserve a plate.

"Old Town" is a historic spot, having been the actual seat of

the first white settlement of the State. It is only four miles or so from "New Town," and within easy walking distance—for a robust photographer. Here can be found the ancient Estudillo House on the forlorn Plaza, home of one of the first families of the coast, speaking chronologically at least, also the ancient, palms, the oldest in our borders, waving still, when all who planted and fostered them are gone forever. Then there is the Catholic church of the decaying hamlet, for, although it is a comparatively modern building, genius has immortalized it and made it as lovable as the finest old ruin. The readers of Ramona, by Mrs. Helen Hunt Jackson, will remember it as the scene of Ramona's marriage to Alessandro.

The attention of those interested in architectural studies, may be called to several fine business blocks in the lower part of the city proper, and to the many costly modern residences in the fashionable suburb, "Florence Heights." Charming surf pictures may be made on Coronado Beach, but are not characteristic in any way. A good evening effect is to be had with a long focus lens, looking from the Hotel del Coronado towards Point Loma, and occasionally a shot can be had at the large Chinese junks engaged in fishing near by.

Going north by rail, a stop should be made at the Mission of San Luis Rey, and a day profitably spent among the ruins of this magnificent church. Its deserted corridors, broken arches and fine columns, viewed in various lights and from different standpoints, make up material enough for a full day's work and at least a dozen plates. Indeed, a second dozen would not go amiss.

At Riverside there are stately avenues bordered by pepper, eucalyptus and palm trees, luxuriant orange orchards, and pretty glimpses of the irrigating canal. Half a dozen plates can be used here to advantage.

Los Angeles contains little of interest to the photographer. There are a few fine public buildings and residences, but nothing distinctive except the bluffs and hills back of the city, with embowered houses perched at the top of long flights of steep steps. Although originally a Spanish town, few adobes are to be found; in fact there are none except those occupied by Chinese and low Mexican families who have "modernized" them to their utter ruin as food for the camera. The old mission church has also suffered from an alleged "restoration," which completely spoils

it photographically. A prolonged stay would, no doubt, develop some good material in the way of figure studies; but the native element is so fast disappearing that it would require time and patience to find the remnants of it. Occasionally a Spanish girl or a Mexican vaquero is met, and would be a "taking" novelty if placed amid suitable surroundings.

Should the visitor take a run down to San Pedro, eighteen miles by rail, he would do well to have a few quick plates and his shutter with him. An Italian fishing boat, with immense lateen sail, coming down the narrow harbor before a fair wind, will make a picture well worth securing.

At Pasadena there are some handsome residences and many pretty streets shaded by beautiful pepper trees—all good subjects for a traveling amateur.

Coming north, Santa Barbara is the next place of importance, and is well worth a week's visit from an enthusiastic knight of the camera. The old Mission Church, built about 1786, will furnish an almost endless number of studies. The best general view is to be had from the olive orchard on the south side, and by adapting one's self to the changing light, pictures of one kind or another can be made in the vicinity throughout the entire day. The graveyard in the rear of the church, containing some fine old olive trees, dilapidated tombs and tile covered walls, must not be overlooked, and if one has the faculty of persuasion well developed, magnificent figure studies may be had by inducing the Francescan Padres to pose near the ruined fountain or in the time-worn corridor of the church. Father O'Keefe is the spokesman of "the Mission" and has always a ready welcome for visitors. There is little in the city of Santa Barbara itself which is available to the amateur, with the exception of the de la Guerra mansion, front and rear, and one or two adobes on State street. Crossing the baranca separating the business part of the town from the "Spanish Quarter," a diligent search will be rewarded by many fine subjects for the camera. Deserted and ruined adobes with tiled roofs, vine-clad cottages, Spanish youths and maidens, and effective groups, may be seen on all sides, and fresh material will be found at every visit, no matter how often repeated. Frequently one may get a good shot on the beach, also, where the knots of Italian and Portuguese fishermen, all unconsciously form themselves into delightful pictures. The visitor is strongly advised, however, to devote himself most especially to such subjects as relate to the Spanish occupancy of this place. Here, as elsewhere, the descendants of the old Castilians, together with their quaint and peculiar dwellings, are rapidly vanishing before the advance of another race and a new civilization, and ere long, every authentic representation of these scenes and this people will possess an incalculable value.

In respect to hotel accommodations, the "Arlington," at Santa Barbara; the "Raymond," at Pasadena; the "Nadeau" and "Westminster," of Los Angeles, are good houses. So, also, are the "Glenwood," at Riverside, and the "Florence," "Horton House" and "Brewster," of San Diego. None of these, however, at present afford the requisite conveniences for amateur photography, and resort must be had to the usual makeshifts for filling plate holders and developing. The "Hotel del Coronado," near San Diego, has a dark room, which, although not all one could wish, is reasonably complete in its appointments.

The time required for the trip outlined above is about three weeks and its cost will be in the neighborhood of one hundred dollars.

TONING BROMIDE PRINTS AND GELATINO-CHLORIDE PAPERS.

By E. J. Wall, England .

Bromide paper is characterized by its exquisite black or pearly gray tones if properly manipulated, but by those, who requiring warmer tones, are at the same time inclined to adhere to bromide paper, it is possible to obtain, by an after process, warm brown and purple tones of great richness. The paper should be exposed and developed in the usual way, and I may add that I prefer either eikonogen or hydroquinone as the developing agent, although I have by no means discarded ferrous oxalate. The image being developed, fixed and washed in the usual way, is treated with a chlorising bath, and any of the following will do, though in every case a modification of tone is obtained, a strong solution of cupric chloride made by mixing solutions of chloride of calcium and sulphate of copper, the resulting sulphate of calcium being filtered out, a mixture of bichromate of potash one part, hydrochloric acid three parts, distilled water 150 parts,

or by solution of mercuric chloride. After treatment with one of these solutions, the paper is thoroughly well washed and if the bichromate solution is used, then a wash in alum water is advisable to remove all the chromate, and is again exposed to light or developed in actinic light with a very weak, well restrained ferrous oxalate developer, or with hydroquinone and carbonate of ammonia; the resulting image should be more or less of a warm tint and may be toned in either of the following baths.

I.—Acetate of soda	grammes.
Chloride of lime	-
" " gold1	"
Hot water500	

Dissolve the soda and lime in the water and when cool, add the gold, previously neutralized and allow to stand for three hours before using.

II.—Chloride of gold1	grammes.
Acetate of soda30	"
Sulphocyanide of ammonium4	66
Distilled water500	C. C.

The redeveloped bromide print may also be toned in almost any of the sulphocyanide baths as given below.

If a rich warm brown is required it is only necessary to treat the print with a solution of Schlippe's salt (sulphantimonite of soda), about ten parts to 500 parts of water, to which has been added a little ammonia.

GELATINO CHLORIDE EMULSION PAPER.

I note in America the revival of the so called "Aristotype" or collodio-chloride emulsion paper, which in England has been replaced by the gelatino chloride emulsion. As I have made a study of these papers, a few notes as to successful working of the same may not be out of place.

Firstly, we note that in its freshly made state, the paper is much more rapid in printing than ordinary albumenized paper and also that in consequence of its body of gelatine, which is the vehicle for holding the sensitive salts in suspension, it is more suitable for thin weak negatives than dense ones, in consequence of the increased contrast obtained by the use of this paper, but if it is required to print from a rather dense negative I always print in a very bright, strong light, under a thin sheet of tissue paper. Secondly, it is advisable in consequence

of its polished surface, to obtain greater pressure in the printing frame by adding a thickness of felt, or two or three thicknesses of stout blotting paper, between the paper and printing frame pad. Thirdly, the paper being much more sensitive to light, it must be handled with even greater care than usual so as not to obtain degradation of the whites.

The depth to which printing must be carried, depends a great deal upon the tone required, and vice versa, usually I carry the printing till the whites are decidedly tinged, but if blackish tones are required then I print till the deepest shadows are deeply bronzed. After printing, the prints may be kept a week without loss of any good qualities except perhaps a slight extension of the time of toning.

For toning, there are innumerable baths suggested, but I need only suggest two or three, my favorite is the following:

Sol. I.	
Chloride of gold	1 gramme.
Distilled water	500 с. с.
Sol. B.	
Ammonium sulphocyanide	30 grammes
Ammonium carbonate	25 "
Distilled water	500 с. с.

For use, mix one part of No. 1 with three parts of No. 2. With deep printing, this gives rich blacks, with dilution with water, warm chestnut browns are obtained. The following suggested by Mr. Tylar, is also a good one:

Chloride of gold	.4	grammes.
Tungstate of soda	4.0	66
Ammonium sulphocyanide	6.0	"
Hyposulphite of soda	60.	6.6
Distilled water	250	с. с.

Disolve the salts in the water and add the gold, previously neutralized. This is a combined toning and fixing bath.

In making and using the toning baths, there are one or two points to be observed which I have also found conducive to successful results. Any bath, no matter what the formula is, must be mixed by adding the gold, previously neutralized, last of all, when complete solution of the other salts has been effected. If alum is an ingredient in any bath, I think it advisable to omit the same and make the bath distinctly alkaline

by adding a small piece (about the size of a filbert) of common chalk to the same. All toning baths should be kept at least twenty-four hours before use, and after use should be filtered and stowed away in the dark, and when required for use again should be mixed with half the quantity of fresh bath and left twelve hours. The question how long a bath should be used I decide merely by the color of the prints, if there is the slightest tendency to yellowing of the whites I reject the bath at once and make up a fresh one, but if the paper is properly washed first, I see no reason why a bath should not last a very long time. I have at least had one in use, and constant use, for over two months, and it works as well as ever, if replenished as I suggest. I have found that no ordinary bath as used for albumenized paper will give such fine results as a sulphocyanide bath.

After this digression on the toning bath we must hark back to the paper as it comes from the printing frame. I always trim my prints at this point, that is before washing and toning. When trimmed down to the desired size, the print is placed in water to wash, and placed face downwards on the top of the water till it begins to curl up at the edges; when it is immersed and thoroughly washed, for at least half an hour, in five or six changes of water, and then placed in a solution of alum 1:20, and allowed to remain for five minutes and then again washed for another half hour and then placed in the toning bath and moved about therein, till the desired tone is obtained, which may be judged by looking through the print and then it is placed in salt and water about 1:20, till all are toned and then, unless a combined toning and fixing bath has been used, they should be fixed in the following bath:

Hypo	5 0	gramme
Carbonate of soda	5	"
Water5	00	ccm.

and they should be left in this bath, or rather moved about in it for fifteen or twenty minutes and then washed for two or three hours in running water.

To obtain prints of highly glazed surface, it is necessary to squeegee them down to some polished surface. I use ferrotype plates, others old negative glasses, and others again specially prepared metal plates. To prepare glass or any surface for the reception of the print, use a waxing solution composed of bees-

wax, almond oil and benzole or ether, and pouring a little on the plate, rub it all over and polish off with a clean rag or tuft of cotton wool. Leave the print till absolutely dry and then it will almost fall off of itself, if not, a gentle pull at one corner will release. For small prints, portraits, etc., I prefer a highly glazed surface; but for larger prints I squeegee the print to fine ground glass, previously waxed and then strip.

Another difficulty often met with, is mounting prints of high glaze without detracting from the same. The only mountants which I know that will answer satisfactorily are a solution of India rubber in benzole, or bisulphide of carbon, and the former is to be preferred, and an alcoholic solution of shellac, as suggested by Mr. Romyn Hitchcock.

The failures in using these papers are not numerous, and I think easily overcome. If the print begins to tone at the edges blue or slaty blue, the toning bath is too strong; but this rarely occurs if the alum bath is used first, and I prefer to use the alum bath and a very strong toning bath. If the print refuses to tone in well defined patches, the print has been touched with greasy or chemically contaminated fingers; if it refuses to tone in irregular, ill-defined patches, then it has not been sufficiently washed. Refusal to strip, is generally due to not using the waxing solution properly or touching the waxed surface with the fingers after waxing. Frequently, however, a gentle warming before the fire will obviate this.

Prints which have not been squeegeed may be dried by merely hanging on a line or by means of clips, and may be mounted in the ordinary way and the surface polished by a pad of soft wet chamois leather. They may be spotted out, provided the colors are mixed with a little warm gelatine solution, and may be burnished or rolled as usual, an alcoholic solution of castile soap being used as lubricant.

A HOME-MADE PHOTOMICROGRAPHIC CAMERA.

By W. H. Walmsley, F. R. M. S., Phila.

It would be quite superfluous in these later days to urge the importance of photo micrography upon any one engaged in investigations demanding the use of the microscope. This was long since conceded, but until the general introduction of highly

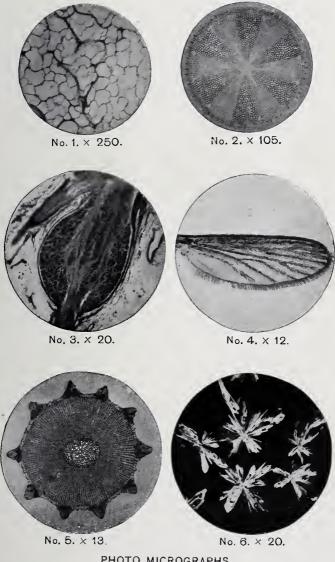


PHOTO MICROGRAPHS,

BY

W. H. WALMSLEY.

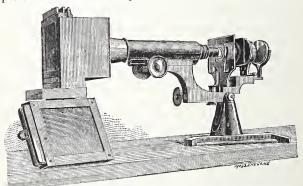


sensitive gelatine dry plates and the consequent simplification of the necessary processes, its practice was confined to the very few whose purses or positions permitted the employment of complicated and costly apparatus necessary for its successful pursuit. The great army of investigators were obliged either to be content with verbal descriptions of their observations, or to make drawings of the same, for which but comparatively few were properly qualified, and which, at the best, were inaccurate and imperfect. But the gelatine dry plate, sufficiently sensitive for use with an ordinary petroleum lamp, has placed within the reach of every worker, the means of recording his observations accurately and with great economy of time and money. Special forms of cameras have been constructed for the purpose, among which the one devised by myself some years since has become well known and is largely in use in institutions of learning, government departments and by scientific men throughout the country. This camera, in common with others of its class, performs the work for which it is intended in an admirable manner, leaving but little to be desired. But it is necessarily bulky, requires a special table or other support, and some little expenditure of time to bring into use, so that many an observation worthy thereof, is allowed to pass unrecorded, rather than devote any of that precious commodity to the arranging of microscope and camera in necessary juxtaposition. A handy little camera that could stand upon the work table side by side with the microscope was a desideratum that many attempts were made to fill, but until the "home made" one I am about to describe appeared, none that came under my observation was at all satisfactory or practical. By far the best of these was the device of Dr. Mercer, of Chicago, in which a small box carrying a plate 23/4x31/4 inches was made to slip on the tube of the microscope, with the ocular in place or removed, as the observer desired. With low powers, good work may be done with this device by a careful operator; but being entirely supported by the tube of the microscope, it is much too unsteady to permit the use of even moderately high powers with any satisfactory results.

A scientific friend (Mr. H. Wingate, of Philadelphia), whose special field of observation comprises the minute fungi of the family of myxogastres, had long felt the want of such a special camera, which could stand by the side of his microscope ready for instant use. He is an expert with the pencil, and his drawings of

the spores and other portions of his minute specimens were marvels of execution, but the time and labor bestowed thereon were a serious drain upon his time, and he determined to call in the aid of photography. But no apparatus could be found suited to his wants, and he therefore determined to construct one for himself. Being quite as expert in the use of his pocket knife and glue pot as of his microscope, his ideas quickly took practical shape, and the handy little camera, of which the following description will, it is hoped, convey to the reader a clear comprehension, became one of the most important adjuncts of his work table.

The camera box, with its projecting cone, is made of heavy, solid cardboard blackened on the inside, to prevent any reflection of light. It is a simple square box, without bellows, increase of power being obtained by the use of higher objectives on the microscope rather than by increasing the distance between the stage and focussing screen, as is done in the larger sized cameras constructed for this work. He did not attempt to make a plate holder, as the admirable ones furnished by the Messrs. Anthony, with their "Lilliput" camera, were both cheaper and better than anything he could have constructed.



Home-made Photomicrographic Camera Outfit.

One of these holders, carrying a plate $2\frac{1}{2}$ inches square, slides into a groove at the rear of the box, and can be replaced by a frame work carrying the ground glass focusing screen, which registers accurately with the plates in holder. The box is firmly glued to one end of a piece of heavy iron fitting from a steam pipe, making a very firm and steady base for its support at the

proper height to receive the tube of the microscope when the latter is inclined to a horizontal position. And this is all there is of it. A pocket knife, a glue pot, an odd piece of steam fitting, a plate holder costing but little more than a dollar, with brains to utilize them, are the factors in producing a practical little camera capable of doing work of the highest order of merit as the specimen No. 1 on plate of illustrations accompanying this paper will testify. The negative was made by Mr. Wingate with this camera and a Zeiss $\frac{1}{18}$ homogeneous immersion objective.

To make a negative with this camera is a perfectly simple operation, which can be performed almost as quickly as the object can be viewed under the microscope after being placed upon the stage thereof. This done, the instrument is inclined to a horizontal position, and, (preferably), the eye piece removed, in which case the tube must be lined with a cylinder of dead black paper or other material to prevent reflection. Light can be thrown through the object either from the mirror or by placing the lamp immediately in the rear of the stage and using its direct rays. The tube of the microscope is then to be inserted into the end of the cone on front of camera, which is, of course, placed in a proper position for the purpose, when the image of the object will be projected upon the focussing screen where it may be accurately focussed with the fine adjustment screw. The insertion of the plate holder, the exposure and subsequent development are presumed to be familiar operations with the majority of my readers and need not be enlarged upon here, further than to say that a tolerably slow plate, rich in silver and developed with hydroquinone, always gives in my hands results far superior to those obtained by the use of very sensitive emulsions. Orthochromatic plates are particularly well adapted to the proper rendering of stained preparations, or those in which various shades of yellow and orange are to be found.

Recognizing the practical value of this device of Mr. Wingate's and encouraged by the suggestions of numerous scientific friends who had seen it, I determined to follow out his idea in a practical manner for placing the instrument upon the market in a commercial way. The result is a compact little affair, aptly called the "Handy" camera. It is well made of polished cherry wood, with cone front, and is supplied with the "Lilliput" plate holder. It is mounted upon a very firm and heavy iron base, with a stout

rod secured in any position by a milled head, in order to adjust the camera at a proper height to suit the microscope employed. It occupies very little space, can stand upon the work table ready for immediate use and its cost is but trifling. Whilst it is not intended in any manner to supersede the larger and more elaborate outfits, its practical value in enabling the microscopist to record his work at any stage thereof, quickly and accurately is, in my estimation, very great.

It may not be amiss in this connection to say that in the opinion of a majority of workers the best results are undoubtedly attained by using the direct image projected by the objective without the intervention of an ocular or eye piece. If higher powers be necessary than are obtainable in this manner with the limited space between stage and focussing screen, an eye piece may be employed, but it should be one specially constructed for projection. Such are made by Zeiss, A. Kellner, or Orthoscopic ocular answers also quite well; but the ordinary Huyghenian form is not suited to producing the finest work. An Amplifier inserted in the body of the microscope is the most perfect method of increasing the power of any objective. It was invariably used by the late Dr. J. J. Woodward, whose world famous photo-micrographs have certainly never been surpassed, if, indeed, they have been equaled by any.

This fascinating subject might be pursued ad libitum, but, mindful of the patience of my readers, it will not at present be further extended than by the following explanation of the illustrations accompanying this article. (See plate of Photomicrographs.) No. 1 was made, as before stated, by Mr. Wingate with his own camera; the others are the production of the "Handy" camera, under my own manipulation:

No. 1. Fungi, Stemonitis ferruginea18	$^{\prime}$ objective $ imes$	250
No. 2. Diatom, Heliopelta $\frac{1}{8}$	" ×	105
No. 3. Ganglion, spinal cord of cat L. $S_{\frac{2}{3}}$	" ×	15
No. 4. Wing of Mosquito	′ " ×	12
No. 5. Echinus spine, transverse section - 1'	′ " ×	13
No. 6. Amygdalin crystals, under the po-		
lariscope 2 '	′ " ×	20

These illustrations give a very fair idea of the original photographs in a general way, but being made on lined plates, do not render the minuter details as would be done in a silver print. In

the originals, the nuclei of cells and ganglion, the finer hairs in tissue of mosquito's wing and the markings upon the diatom are clearly and distinctly shown.

THE "ONE SOLUTION" DEVELOPER.

By Walter A. Watts, England.

That "development is a science" is almost an axiom in photography, and that "there is no royal road to development" would be the teaching of the oldest and most experienced members of the Black Art fraternity; but there seems to have sprung up of late years, simultaneously almost with, at all events consequent on, the introduction of the dry plate with its many facilities, a new race of photographers, whose great cry is to have everything made easy. Whether this making of everything easy is conducive to the advancement of art is perhaps another matter-it certainly seems to advance the interest of the plate maker. It seems to the writer that it may possibly be worth while, especially in the pages of an annual so widely diffused as this, and read so extensively not only by the experienced whom he does not address, but by the tyro, whose interests he wishes to serve, to attempt to stem the rising tide in some degree, although he cannot help recalling the case of Canute, absit omen. There are, indeed, many so-called photographers who merely purchase a camera, perhaps ready loaded with plates, and limit themselves to setting up at what seems a favorable point of view, focussing and pulling off and replacing the cap, afterwards sending off their plates to be developed, retouched and printed; such, however, hardly rank as photographers—they are machin-But even amongst those who really take an interest in photographic work, and who honestly desire to learn, there is, perhaps, too much of a tendency to adopt mechanical methods, as being easier to the beginner, and in no department of the work is this so fatal as in development. Mechanical development is the arch enemy of artistic negatives. The beau ideal of easy development would, no doubt, be a "penny-in-the-slot" machine-"put your plate in the drawer, drop a penny in the slot, wait five minutes, pull the knob, and the plate will be delivered to you, developed and fixed." Absurd as this may seem, it is only one degree more absurd than that idea of having a * liquid in a bottle, composition unknown, which you have only to pour over your plate, rock three minutes, then return to the bottle, and your plate is ready for fixing; but this is really not an exaggerated account of a mode of development which is getting not uncommon, and which is responsible for spoiling many plates and not a few artists.

That there is a demand for the one solution developer, the advertising columns of popular photographic journals sufficiently prove; but such a mode of applying the developer is both unscientific and must necessarily fail in bringing out the best possibilities of each negative, as a little consideration will show.

In the first place, from the very constitution of the developer, it would appear that from the instant it is mixed it must begin to deteriorate—inasmuch as whilst dry pyrogallol will keep indefinitely, as also in an acid solution, or in presence of sodium sulphite not alkaline, not having in that condition a very active affinity for oxygen, and similarly, dry carbonate of sodium or potassium is not liable to chemical change, and even ammonia only loses by evaporation—the moment the pyrogallol is mixed with the alkali, oxidation begins, so that in a very short time what was a clear light colored solution becomes opaque and muddy. So rapidly does this action occur under favorable circumstances that a strong solution of pyrogallol, mixed with caustic potash, is used in analysis as a means of absorbing all the oxygen in a few minutes from a measured quantity of air. A similar action, though perhaps not so rapid, takes place with hydroquinone or eikonogen, and, no doubt, with all those organic substances which have been or may be in future proposed as developers. It is quite true that this oxidizing action takes place much more slowly in presence of sodium sulphite, when neutral or slightly acid, hence the preservative action of this substance and its value in keeping the solution clear; but when rendered alkaline. as it is in the mixed developer, whether a one solution one or mixed at time of development, the oxidizing action takes place, though slowly, in comparison with the plain pyro and ammonia, still with considerable rapidity, as any one will be convinced by leaving some mixed developer out exposed to the air for twentyfour hours.

It is, in fact, only the preservative action of sodium sulphite, coupled with the somewhat slower oxidation of hydroquinone or eikonogen, which are more usually employed for this purpose, that has rendered a one solution developer in any degree feasible.

Of course, we must couple with these the facts that a strong solution oxidizes more slowly than a diluted one, and that by keeping the stock solution corked up, it is in a measure protected from the action of the air. Still at least one developer has been proposed which consists of a single liquid, sufficiently dilute to be used without adding water, and which is intended to be poured over the plate and after development is completed returned to the stock bottle, the liquid in which must therefore, of course, be different in composition after each time of using a portion. I think, however, enough has been said to show that even those one solution developers, which are intended to be used only once, must be constantly varying in composition, particularly in the relative strength of pyro (or hydroquinone) to alkali, so that even supposing such a one to be, when newly prepared, the most efficient form in which a developer can be applied (which is far from being the case), it could not long continue so, particularly after the bottle has been opened a few times. Were this want of constancy of composition, however, all that can be urged against this form of developer, the matter would not, perhaps, be of much consequence, inasmuch as the change of composition is accompanied by a certain amount of darkening, and it would be easy for the user to throw it away and get a new bottle whenever, say, he could no longer read print through a certain thickness of solution. Such is by no means the case, the very form of the developer with its fixed constitution, being fatal to all that characterizes scientific development, by which I mean, so adjusting the proportions of the constituents as to suit the exposure, the subject and the resulting quality of negative. Let it be borne in mind that a well proportioned developer contains three constituents, each of which has its own function, and should be susceptible of alteration, as necessary to produce a harmonious negative. We have the oxidizing agent, the active ingredient, which may be either pyrogallol, hydroquinone, eikonogen, hydroxylamine, catechol, or probably any one of fifty other organic agents; then, to give activity to this, the alkali commonly known as accelerator, which may be ammonia, soda or potash, or one of the carbonates of these, even lithia, a lime or barytha water, not being without their advocates; and, finally, the restrainer, whose function seems to be to keep back too active development until the high lights can acquire sufficient density, and for which again a variety of substances may be used, such as potassium or ammonium bromide, citrate of

potash or soda, potassium ferrocyanide, bi-carbonate of soda, etc., and as a sort of P. S. is frequently added, a preservative like sodium sulphite, which, unless it acts as a mild restrainer, has no particular function in development proper, but is of great value in preventing the staining of the plate and modifying the color of the negative. Now, whilst the experienced photographer could probably compound an efficient developer with any one of each of these three classes, each photographer has usually his own favorite developer to which he is accustomed, and which works better in his hands than a strange one would do; at the same time the universal testimony is that, to produce the best effect, the power must be left of varying each constituent proportion as experience shows to be desirable.

Suppose, for example, that upon pouring the developer over the plate, the picture comes up with a rush, showing over exposure, how advantageous it is to be able at once, to add some restrainer and so keep back development until there is time to attain something like proper density; or better still, if over exposure be suspected, or even possible, to begin by adding a solution, weak in alkali, and only gradually to increase it as development progresses and its need becomes apparent.

Or take the opposite case of under exposure, how desirable it is, at once to add accelerator and so in many cases produce a presentable negative which the one solution developer, unless unusually strong in alkali, and therefore unfitted for plates in the least over exposed, would have failed to develope. Again, bearing in mind that increasing the pyrogallol tends to increase density, and that slow development has the same effect, it is surely desirable, when we have a subject deficient in contrast, to use a developer strong in pyro, and well restrained; and, on the other hand, if there be violent contrasts of light and shade, to lessen the pyro and restrainer and increase the alkali. All these adjustments, and many others which will immediately occur to the experienced photographer, can be readily made, by having separate solutions, but are impossible if we are limited to a one solution developer, unless, indeed, we add to our original stock bottle supplementary ones containing, respectively, supplies of alkali and bromide, a plan which, so far from being less complicated than the normal three separate solutions, seems more so.

As regards the best form in which to keep the developer, the almost universal consensus of opinion is in favor of three, pref-



HER SEVENTH BIRTHDAY.



erably ten per cent. solutions, viz.: (A) Developer proper, to which may well be added sodium sulphite for preservative purposes (Berkeley's sulpho-pyrogallol is a typical solution; (B) accelerator, containing either ammonia or carbonates of potassium and sodium, and (C) restrainer, preferably potassium bromide. Normal proportions of these, susceptible of variation as indicated above, being: (A) 20 minims (B) 20 minims, (C) 10 minims, to the ounce of developer, and tables have been published showing at a glance what proportion of each to take to make up the precise developer recommended by each principal maker as specially suited to his plates, although it is wise to bear in mind that the tendency of makers is to state the full quantity of ammonia that their plates will bear, hence giving the impression of great rapidity, and that it is usually wise to begin with not more than half the full quantity of ammonia, gradually increasing it as development proceeds and the necessity for it is indicated.

Should the three solution method be considerered rather complicated, the next best is to employ two solutions, developer and accelerator, the most useful proportions of potassium bromide being usually added to the latter, although even then it is desirable to keep a ten per cent. solution of potassium bromide ready for resort in cases of necessity. The two developers of this nature which have given the best results in the writer's hands, and which he would recommend to any beginners in search of a thoroughly good developer, are the American Standard Developer, of Mr. Newton (or rather a modification of it, employing sulpho-pyrogallol in place of dry pyro) and Thomas' Hydroquinone Developer. Both these are well known, but for convenience' sake he takes the liberty of appending the formula, disclaiming, of course, any originality.

AMERICAN STANDARD.

A.	Water	32	ounces.
	Potassium ferrocyanide	3	66
	Sodium carbonate (crystals)	3	"
6.	Potassium carbonate (dry),		"
В.	(Sulpho pyrogallol 10 per cent.)		
	Pyrogallol	1	ounce.
	Sodium sulphite,		ounces.
	Water	9	"
	Citric acid to render neutral.		

Take of Λ , 1 drachm; B, 20–30 minims; water to take up one ounce.

THOMAS' HYDROQUINONE.

Α.	Hydroquinone		
	Sodium sulphite,		ounces.
	Citric acid	60	grains.
	Potassium bromide	30	"
	Water,	20	ounces.
В.	Sodium hydrate	160	grains.
	Water	20	Olinces

Use equal quantities without dilution, although in both cases I should advise using, in the first instance, only half the alkali, adding the remainder to secure density, when the high lights are out, unless the plate be over exposed, in which case the second half will not be required.

PHOTOGRAPHY IN THE WITNESS BOX OR GAS VERSUS ELECTRICITY.

By G. M. Whipple, B. Sc., F. R. A. S., F. R. Met. Soc.

An incident lately occurred, in which photography was able to offer material evidence in favor of a gas company charged with failure to fulfill its obligations to its consumers, as laid down by act of parliament. The leading movers in bringing against the company, charges of inadequate supply and impure gas, were certain persons who were at the time, most active in their endeavors to obtain the establishment of an electric lighting service for the town. The official gas examiner's reports, submitted to the local authorities from time to time, showed the gas supply to be in proper accordance with the requirements of the act, but these reports were discounted by the electric party setting affoat an unfounded charge of collusion in their preparations between the gas examiner and the manager of the works. As the Kew Observatory has no less than seven scientific instruments constantly recording atmospheric and magnetic changes, by means of photography and is supplied by gas, manufactured by the company in question, it was decided that these records which are being produced day and night without intermission, Summer and Winter, year after year, offered valuable information as to the regularity and quality of the gas supply. An examination of a year's curves was accordingly made and the result showed that on no single occasion during the whole of the year, did the gas supply to the observatory fail, nor did the purity of the gas fluctuate to a sufficient extent to effect appreciably the quality of the photographic traces, of the various phenomena recorded. A certificate to this effect from the secretary of the Meteorological office, together with specimens of the barograms being produced, the gas tester's statements were accepted as correct and his opponents withdrew their case, as having no leg left to stand It was mentioned incidentally that the observatory was well fitted with gas governors and kept the whole of their apparatus in the best possible order, so that the minor fluctuations in gas pressure, inseparable from every system of public supply, were eliminated before they affected the registering instruments. This showed, therefore, that by due attention to their fittings, gas consumers might often remove many of the causes of annoyance which are frequently unwarrantably laid at the door of the company's officers.

BLISTERS IN STRIPPING FILMS, NEGATIVES, ETC.

By G. W. Valentine, Southampton, England.

During the warm Summer weather, frequent complaints are heard of blistering, usually making their appearance in the photographic weeklies.

The chief cause of blistering where gelatine is concerned, is due to the sudden changing or cooling from a warm bath to a cold one.

For instance, in developing a negative in a small or a badly ventilated dark room, which perhaps has been occupied for some half an hour or more by the photographer, and which in consequence has become very close and heated. The developer, in a like degree, also has become considerably increased in temperature. If, now, the negative, after being in the warm developer some time, is transferred to a freshly made fixing bath, and the water that is added to it, be taken from the water tap or well, as the case might be, the chances are that in transferring the negative from the warm developer to the fixing bath, the film, coming in contact with the cold water, floats off and considerably expands in dimensions, and then the only remedy left is to soak the film in

methylated spirit. I usually make it a custom now, in warm weather, to keep all my water required for developing, fixing and part washing waters, in the dark room at least twenty-four hours beforehand, and in consequence never now get any signs of a blister.

AN INTERNATIONAL INTERCHANGE OF LANTERN SLIDES.

By F. C. Beach, New York.

The International Annual is surely the proper medium to bring to notice an enlargement of the plan of the present American lantern slide interchange, as the title above given indicates. Steamers now ply so quickly between the two continents that there is no reason to prevent an international interchange of lantern slides between American and foreign countries. The idea I have to suggest is for several photographic societies in England to combine and send over to America each year, one or two hundred of their latest slides, having a list made out, with interesting facts added for each picture; this set then to go the rounds of the societies or clubs forming the American Interchange, and then to be returned to England, there to be redistributed among the contributing societies. An American box of slides would in the same way be sent to England and come back again.

The success of such an undertaking will depend on the proper men to look after it in each country. Interchanges could be made with France, Belgium, Austria, Germany and other countries, and would afford an almost unending variety of pictures.

I trust the suggestion may receive the attention of some of the foreign societies.

AN ENGLISH ALPINE VALLEY.

By Adolph W. Beer, England.

Little known to the vast majority of English travelers, and less still to strangers or visitors from beyond the broad or narrow seas, the valley of the Esk, in the northern county of Cumberland, is worthy a better and fuller notice than it usually receives, and certainly to a more detailed monograph than can for obvious reasons be permitted here.

Possibly the difficulty of access has had something to do with keeping the locality comparatively unknown, at any rate the few names in the visitors' book at the little inn at Boot seem to be, either pedestrians on their tours or visitors at the rising watering place of Seascale, a mile or two from the estuary of the river. Two routes are open to reach this dale, one from the lake district proper, starting from Hawk's head and entering Cumberland by Hard Knott pass, which road conducts us to the head of Eskdale-the other by rail via Grange and Furness Abbey to Ravenglass, about half way between Barrow-in-Furness and Whitehaven. We would suggest the latter (because the easier), and one bright Spring afternoon found us in Ravenglass, a decayed and almost deserted seaport and once a market town, ruined by the two rivers that flow into the sea at either end of its very wide street of melancholy, neglected looking houses, some of which seem to have collapsed and others inclined to follow suit; one end of the town opens on the beach of the estuary of the Esk, and the other on that of the River Mite, while on the sea front, low hills of silted up sand, give the reason for the decadence of the town. A little schooner left dry at low water is being unloaded by small two horse farm carts, and its cargo dispersed inland to the country homesteads, gives an opportunity for some quaint "shots" which are duly transferred to our 10x8 before the red sun dips in the distant yellow sands. We use the Eskdale and Ravenglass Railway for our exploiting of the dale, a tiny narrow gauge affair, of which the title seems to be the largest part. A miniature engine draws a single little coach over a ricketty, dilapidated permanent (?) way, at a speed which would cause a tramway horse to blush.

Close to Muncaster Station, the first halt, is a very pretty combination of mill, waterfall and old house, with stone mullioned windows and thick walls massed together under the hillside; and from this point Muncaster Church and Castle may be visited. As we get higher up the valley, the hills close in front and on either side, while the River Mite which bubbles and gurgles by the road side has a steeper fall. But we soon leave this stream and wind round under the hills into Eskdale proper. Near to Beekfoot are the two great falls of the dale, viz.: Stanley or Dalegarth fall and Bicker Force. Crossing the Esk by an old stone bridge amid a many foliaged wood from which, looking up stream through the openings of the trees may be composed as perfect a picture

of wood, boulder-strewn stream, hamlet and distant mountains, as one can well hope to see. Just beyond, we enter the Dalegarth grounds and are provided at the cottage, with a master key for the padlocks on the gates in the woods leading to the fall. footpath runs up the side of the little Stanley Gill, which is not unlike the Torrent Walk in North Wales, but as we get higher and higher, we find that owing to the conformation of the cliffs that soon close in the stream by lofty precipitous banks, the footpath is carried three times from bank to bank, by rough wooden bridges that don't feel particularly safe, ere we reach the great gorge or chasm containing the principal fall. Here by a grand freak of nature, the mountain seems to be split open, and between two lofty cliffs seemingly two or three hundred feet high, the river courses down the side of the gulf and falls into a dark pool below. All the way, up or down the glen, are a succession of delightful studies, fresh and sparkling in the clear Spring light, while foregrounds of silver birch or wavy ash are on every hand.

Half a mile from Dalegarth, through another break in the hills, amid weird and romantic surroundings, is the awe inspiring Bicker Force. Here no foliage forms lacy festoons over the falling water, or drapes the rugged and barren rocks; but though bare and unrelieved, this fall in its lonely grandeur and imposing mass, has a weird charm that is entirely wanting in most of the small and tame waterfalls of the Lake district, and has the additional attraction of freshness and novelty. Down in the valley beneath, the village of Eskdale and its antique church seem almost lost amid the immensity of its surroundings. Leaving the village to the right, a short walk brings us to the head of the dale and to Boot. On either side the mountains form great ramparts of the valley, and in front, crowned by a cairn and flagstaff is Boot fell. The tiny hamlet of Boot, snugly ensconced under the hills at the foot of giant Scawfell, is a quaint cluster of old houses, round an ancient one arch stone bridge, draped with ivy and shaded by foliage; just above and abutting on the bridge, is an extremely picturesque village mill, with a pair of overshot wheels, while all around, a perfect galaxy of waterfalls distract the eye. At one point, the stream comes bubbling and splashing down the rocks like a rythmic Lodoxe, and at another in grand burst and deep swirls, all mingling with great masses of foliage, rocks and mountain side, forming an

almost bewildering scenic display, while the various streams mingle and flow away quietly under the greystone bridge on their course to the near sea. It is not all fair weather among the hills, and as a variety from the bright sunshine we started with, we witnessed a mountain shower in the afternoon, although away yonder to the west, far down the valley, the sky was blue and clear and the waves glistening in the sun. Yet at the foot of "the eternal hills" under gray skies, a cold damp wind swept down the hillside, and presently with a swish and a hiss, the torrent of rain fell with a suddenness that was quite startling, but fortunately we had reached our tiny railroad carriage, and our plates being all exposed, we could calmly and serenely watch the gusts of rain flying across the valleys, until shortly we ran down into warm sunshine at Ravenglass again.

No amateur photographer who cares to cull flowers of scenic beauty, unsoiled and unspoiled, will regret a visit to Eskdale. The softly swelling hills and mountain torrents of this section of the English Switzerland, hold much of that wild charm so fascinating to the traveler, artist or not, while to the former I can safely assure him that there is stuff in any quantity for his cameras or brush. Pictures low in tone on the estuary of the Esk or Mite, or the dark glens of the rocky chasms; pictures bright with color in the open valleys, watered by streams whose stony beds break up the sight into a thousand dancing forms, where are the ancient north country villages, with cottages white as limewash can make them, or gray with the storms of ages on their old stone walls.

INTENSIFICATION.

By J. W. Crowse, England.

It is an acknowledged fact that the most common error committed by amateurs and beginners is that of over exposure. It appears to be very difficult for them to realize the fact that a photographic impression can be produced on a sensitized plate, in so short a space of time as a fractional part of a second, and when exposing, the general feeling is an almost irresistible inclination to give plenty of time, and so make sure of a result, the said result being generally an over exposed plate. In the majority of instruction books in photography, little or no infor-

mation is given on the subject, more than the assurance that correct exposure can only be learned by long practice and experience, and a recommendation to the student to over expose rather than under expose. The consequence is, that over exposed plates, useless in their present condition, constitute the bulk of a beginner's first attempts. By intensification, many of these may be made to yield prints more or less presentable. But to the tyro, the process of intensification appears to be a very formidable affair, and after a few attempts resulting in failures, it is given up. This being the case, a few concise directions, by following which they may with very little trouble succeed in utilizing some of their spoilt plates, will perhaps be acceptable to the amateur readers of the International Annual.

There are many processes employed for the purpose of intensification, but it is unnecessary to describe more than one or two which are convenient and reliable.

We will assume that a negative has been developed, fixed, washed and dried; it is now ready for varnishing, but upon examination it is found too thin to yield vigorous prints. It must therefore be intensified.

First soak the negative in water, and then wash for an hour or more under a tap of water, to eliminate every trace of hypo from the film. This is most important, and most failures arise from neglect of this thorough washing. When all hypo has been removed, the plate is ready for the first process, which is bleach-Make a solution of sixty grains of mercuric chloride, and sixty grains of potassium bromide in six ounces of distilled water, place the negative in this and gently rock the dish for a few minutes, then allow it to rest until the image is bleached. It will soon begin to get lighter in color, and according to the amount of increased density required, the bleaching must be continued; if only a slight intensification is required, the plate should be removed when it has attained a dark gray color; if greater density is wanted, it may remain until nearly white. When the right color is reached, remove the plate and wash for fifteen or twenty minutes under the tap to remove any free mercuric chloride from the film. Next place the plate in a bath consisting of sixty minims of strong solution of ammonia in six ounces of water. The film will now rapidly darken, and the image become of a deep black color. If the bleaching has been carried too far, the density will be too much and the negative will give hard chalky prints,

devoid of half tones. If double the amount of potassium bromide is used in the bleaching solution, the darkening of the film when in the ammonia bath will take place slowly, and may be stopped by removing the plate when sufficient density is obtained. This variation in the solution gives a rich brown toned negative which prints well and preserves the half tones. Instead of using the ammonia bath for darkening the film, in some cases lime water used in the same way will be found to give better results. In this case, should a powdery deposit of lime carbonate be formed on the film, it may be removed by placing the plate in a bath of dilute acetic acid (1 in 40).

This process of bleaching with mercuric chloride and darkening with simple alkalies, is the one most commonly adopted, but many authorities state that the negatives thus treated are not permanent, but are liable to fading. However that may be, if the precaution is taken of well washing, before and after each process, there is little to fear on that score, as they will last for some years.

Another process is to treat the bleached negative with ferrous oxalate developer instead of the ammonia bath. This requires care, or stains will result. A process which has been largely used lately is to bleach with a simple solution of mercuric chloride (ten grains to one ounce of water), and after well washing, redevelop with hydroquinone developer. This gives excellent results, free from stains, and is most useful where only a moderate amount of increased density is required.

In the above process, mercuric chloride is employed, and apart from its being a very poisonous chemical to use, the process occupies some considerable time in bleaching, washing, etc., and it has the further disadvantage of having to use two separate solutions, and in reality two processes to be gone through.

These drawbacks may be avoided by using the uranium intensifier, which in my own practice has proved the simplest and best of all intensifiers; make a solution of sixty grains of nitrate of uranium in three ounces of distilled water, and one of sixty grains of bright, clear crystals of ferrideyanide of potassium, in three ounces of distilled water. Mix the two solutions together—this is the intensifying solution. After well washing the negative, place it in the solution and very carefully watch the result. When the required density is attained remove the plate, wash under the tap and allow the plate to dry. This process gives an image of a deep reddish brown color, full of

detail and prints admirably. This process is simple, quick and under control, and if the washing be thorough there is little chance of failure.

It sometimes happens that after being intensified the negatives are too dense to print from. In such cases the density may be reduced by the following process: Make a five per cent. solution of hyposulphite of sodium and add to it, sufficient clean crystals of ferridcyanide of potassium, to make a lemon-colored solution. When a plate is placed in this solution the density is reduced very rapidly, and the negative must be removed just before the necessary reduction is reached and washed in water for ten or fifteen minutes. When dried it will be found to be much thinner and to yield softer prints. The great secret of success in intensification and reduction, is the use of plenty of water to ensure an absence of chemicals in the film. If the slightest trace of hypo be left behind, bleaching will not take place satisfactorily, and if any mercuric chloride be retained, stains and markings will be inevitable.

Should any reader be curious as to the chemical decompositions which take place in these processes, I must refer him to the many standard works on photographic chemistry, and have purposely omitted the theoretical portion, thinking it would be somewhat out of place in a collection of practical papers, as your Annual has hitherto been. My object has been to give a few practical hints, to enable those who may have found a difficulty in utilizing the results of over exposure. In conclusion, I would offer them a word of advice, which is, Prevention is better than cure. Save yourselves all the trouble of intensification and reduction by studying the factors which govern exposure and their combinations and thus endeavor to secure, not over or under, but correctly exposed negatives.

THE CHEERFUL AMATEUR.

By Emily Culverhouse, England.

Photography's an illustration
Of a very taking occupation.
The pleasant preparations made,
Sol tenders his propitious aid.
The photographs we show with pride,
Our worthy friends are satisfied,
And we conceive a plenary
Of virtuous self complacency.

But seldom we philosophize,
When subtle difficulties rise.
When all the labyrinthine ways
Photography's black art displays,
And delicate manipulation,
Give no result—but aggravation.
These points, Tom Smith, our amateur,
Had learned with patience to endure.

His notions sprang from highest source, Yet blunders marked his upward course, For failures were, he would confess, But stepping stones to great success, An argument that made (no wonder) Our hero hail with joy each blunder, Welcoming each misfortune, he Would sing "excelsior" lustily.

His camera was a caution reckoned,
Daguerre had one—his was the second;
No bellows, swing back, front to rise,
No effort made to modernize,
His lens would scarcely draw Sol's rays
To light his pipe on Summer days.
Tom saw no fault. How rare to find,
Such sweet tranquility of mind.

So unsuspecting was his face
That tradesmen never feared disgrace,
By offering him at high priced rates
Their ancient chemicals and plates,
Which he unquestioned, always took,
And never brought their frauds to book.
From every disappointment, he
Took comfort incidentally.

Pinholes, frilling, and halation,
All would bring him consolation,
His negatives were fogged and weak.
The slides admitted sunny streak,
Green fog, red fog, yellow, gray,
Each in turn would have full sway,
Or hypo stains of yellow hue
Would penetrate his pictures through.

His cheek would flush with hope elate
To find two pictures on one plate,
Or tramping many weary miles
Oe'r fresh ploughed fields, and awkward stiles,
Returning, to the studio hied,
Found plates omitted from the slide,
"Experientia docet," he
Would then exclaim right merrily.

For toning, a long time he waited, His gold chloride precipitated, His studio lamp was quite a joke, T'would darken all the air with smoke, The colga oil refused to burn, Kerosene would not serve his turn, But still from every spoiled plate, he Advanced his favorite theory.

If on the continent he went,
In vain his time and labor spent,
For custom officers suspected
The impedimenta he collected,
His plate box ope'd with ruthless hand,
But finding nothing contraband.
Tom cried with glee when all was shown,
"There's light upon that subject thrown."

One day when camera armed, Tom found A fitting scene on rising ground, A bull was reconnoitering too, And trotted up to interview, Gave Tom no time to interfere Or place a stop on his career, But sent the camera down the hill, Like the famed pail of Jack and Jill.

Then suddenly to Tom he sped And tossed him quickly o'er his head. Ah, fatal blow! the neighbors found Him nearly dead upon the ground. "Ah, world," he said, "I've conquered you, For in my pleasant journey through, You did your best, without success, To worry me to dolefulness."

Raising with pain his bruised pate,
"I stand," he said, "at Heaven's gate,
My aching shoulder, comfort brings,
Developing angelic wings.
My banner soon will be unfurled
Beyond the photographic world,"
Then took his cheerful spirit flight,
Where no clouds hide the beauteous light.

MAORIANA.

By Wm. Dougall, Invercargill, New Zealand.

I suppose that your Boston readers at all events, will dispute the claim that New Zealand is the centre of the universe. Well, if not the centre, then I must content myself by claiming that it is at all events an important and most interesting point on the circumference. While there are many and serious drawbacks arising from living in a remote country very sparsely populated, yet the very fact of being at such great distance from the centres of the world's "giddy throng" has its redeeming features. To New Zealanders, their little Arcadia is just the focus point of all the world's progress, and while making no pretensions to being a literary people in the sense of making books, yet we eagerly watch with comparatively unprejudiced eyes the competition between nations for the honor of the foremost place in science and art; and while there are many who will deny that photographic work may be classed as art, yet the multitude is with us, and the next decade will prove that photography no less than painting, and more accurate, will rank as the foremost of the arts. Why! look at the progress of the last twenty years, or-to come closer still-the last ten years. The fact is that our beloved profession is moving onward at express speed-so fast, indeed, that comparatively few of us are really "in the swim." To keep pace with the many advances, requires much reading, much thinking and much work-But New Zealand, what about it, just wait a wee. As I write, I have at hand, in this focus point of the world, American, English, continental and colonial publications, and not by any means second are the American works-full of detail, as we would say of a good negative, and embellished in such a handsome manner that I almost wish I was not a Scotchman; then I would be, as "Thingamybob" says, an American. Aha!

This is a sunny land of ours, with a climate just almost perfect, a soil that will grow almost anything, and beauty spots which have the enthusiastic admiration of our thousands of visitors—those who leave Europe to escape the cold, bleak Winter, and those who leave Australia to escape the heat scourge which every Summer, visits that progressive colony. "The sounds" of our West Coast are said to have as fine scenery as any in the universe; our lakes, with their mirrored reflections of snow clad mountains, from 3,000 to 9,000 feet high, are just too sweetly lovely to describe; they want the camera of a Jackson or an amateur like Mr. J. H. Smith (of Chicago) to do them anything like justice. And our terraces and hot springs-ah! the former are gone (for one day, at least); they are forming again; they were blotted out by an eruption which neglected to send preliminary notice of its coming; but the geysers remain and still attract visitors to the north island. I am sorry the terraces are gone; they were such wondrously beautiful works of nature; but, thanks to photography, we can still look upon them-we can count the steps, reckon all the flaws, nay, more than that, we can identify the very Maori who sits upon the edge of his natural bath; and we can recall all the circumstances, just as if we were looking on those terraces now. Whereas all that marks their place is just a big, black, water hole.

New Zealand is the scenery land; only a few portions are commonplace; some of our smaller towns are like fairy haunts, while Dunedin, our leading commercial city, forms from its bay, a crescent of matchless loveliness. With a population of only 600,000, we have very few large towns, the largest population being under 34,000, while we have quite a host of towns of 1,000 to 5,000 population. In the larger towns, competition has, as usual, been the means of greatly reducing prices and, with that, quality of work; but, after all, the New Zealand photos compare very favorably with those from any other part of the world. Judges say, it is on account of our good climate, but I would rather say it arises from our limited population, and the best man gets the business. So far as my own practice is concerned, I don't think that by reducing prices I would get a bit more business. I get 30d. for cabinets and 15d. for c.d.v. I

always keep on good terms with my customers, and the result is that they never think of going elsewhere.

The view trade is very much cut up. Several firms, who, as portraitists were not a success, went into the view business, got up distribution schemes, and had canvassers all over the country selling views, a shilling a copy a week, the result was that the colony was flooded with views having no claim for artistic merit, but fortunately this game is about played out, and after all, it has perhaps developed a love for that which is really beautiful. leading firms throughout the colony do a very fair business. think photography is more popular in New Zealand than in the old country, perhaps because the working man is more to the front here than at home; indeed this is the working man's colony. We have comparatively few wealthy people, and while the working man may not have all he wants, yet he at all events lives better than at home, and is more independent—very much. material we use is imported from Europe. The Ilford plates are reckoned about the most satisfactory. "Trapps," "Marions" and x sword albumenized papers. Pyro development, a large number of bromides are done up to "24x18" on Ilford paper, but I note with pleasure that the Eastman paper is now procurable. Hydroquinone development has not been generally adopted, and I am afraid it will not readily supplant Pyro and Ammonia. By the way, I often see queries regarding floating and fuming of albumenized papers—well, on a fifty grain bath, alkaline with ammonia, I never float more than from half a minute to one and one-half minutes. I have never seen the samples of paper that will stand, at the outside, over three minutes. I find one and one-half minutes long enough for an ordinary brand of paper. A good rule is to leave it thirty seconds; after it lies flat, draw over a glass rod, and thoroughly mop on a sheet of thick blotting paper-dry on a net of twine over the gas-fume in a close box for four minutes-print a little deeper than wanted when finished and tone in a bath composed of five grs. gold in sol.; put this in toning dish, add two drops of sat. sol. bicarb. soda—forty ozs. warm water and one teaspoonful of salt. This will tone ten sheets of paper in about fifteen minutes; seventy-five per cent of the failures in printing, arise from the paper being floated too long-keep a small deposit of bicarb. soda in silver bath-bottle, pouring out each time and it will keep your solution clear as crystal. I am very fond of lantern slide work and have lately been doing them on wet plates, they are so

much more brilliant than either bromide or chloride plates, but the increasing demands of business have prevented me from pursuing this beautiful branch as far as my inclination would lead me. And now, taking New Zealand as the focal point, I note with pleasure the great strides being made by our beautiful art in Europe and America. I specially admire those very fine photogravures done in Germany, but where is Britain? far, far behind. I have yet to see the photogravure or block print that will compare with those done in America or Germany. I am afraid that England is falling out of the ranks of progress. One word more and that for America. I have in my possession one copy of a lady's face kindly sent me by your "Airbrush" Company as a specimen of their work some years ago; it has been the object on my sight board, for two years and is enthusiastically admired by all who see it. How I wish I could take my place behind that little instrument.

With fraternal greetings to my comrades in the States and wishing them every progress and the premier place in our fascinating profession, I remain yours faithfully,

THE NEAREST PHOTOGRAPHER TO THE SOUTH POLE.

INTERFERENCE DIAPHRAGMS.

By "D. B.," New York.

Those interested in orthochromatic work may find of some practical use, a hint on the construction of an apparatus for holding an interference screen, which I have found to work admirably.

The scheme is not startlingly new, nor altogether original, but it has worked successfully in my hands and I have never seen anything in use exactly like it.

To Mr. Henry Beadel, of New Brighton, is due a large share of credit (if credit there be) for its invention.

The apparatus is simply a combination of screen and diaphragm made in the following manner:

Cut several pieces of very thin lantern cover glass to the size and shape of the diaphragms of the lens to be used. Cut also a like number of pieces of thin black paper, the same sizes and shapes. Cut in these pieces of paper, holes of the size and in the position of those in the diaphragms which you intend to use. Now coat the glasses with collodion stained the proper color, and paste the



GOOD-NIGHT.

Original Negative by BYRNE & Co., Richmond. Reproduction by PHOTOPHANE Co., London.



papers on the coated side of the glasses and your "interference diaphragms" are completed.

This method has the advantage over the old one of making a film of collodion over the opening of the regular diaphragm, in that the screen is always ready for use. The idea of pasting the paper on the coated side of the glass is to protect the film from being scratched when it is slid into the diaphragm slot. It is quite important that glass be selected, that is entirely free from the irregularities so common in very thin varieties.

INEXPENSIVE TRAYS.

By E. F. W.

In conducting the operations of silvering, toning and the development of bromide enlargements, the expense of large trays, is with many, a serious consideration.

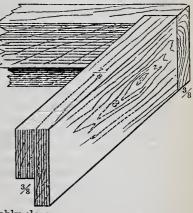
The following directions for making such trays while offering nothing especially new, may be of some service.

Smaller trays up to 8 x 10 may be made of ½ inch back board with butted joints and well nailed with wire nails.

Larger ones should be made of 1/8 stock with bottoms of 1/2

inch or glass as preferred. The method of putting together of these, should be as designated in the drawing.

The ends are rabbeted as indicated and the rabbet for the bottom made before putting together. Sides and ends should then be thoroughly nailed and the bottom filled in. If this is of glass, it should be bedded in putty and set much as a pane of glass would be. Wooden bot-



toms should be fitted reasonably close.

When put together the whole should be coated thoroughly with the following composition:

Rosin	 1	part	by	weight.
Beeswax	 2	"	"	"
Paraffine	3	66	66	66

Melt and apply hot with a brush, the tray having been warmed as much as possible.

In trays of extra large size, say 16x20 or over, I have found it a good plan to coat the bottom with the composition and iron into contact a piece of cotton cloth before washing into the tray Then another coat of above composition all over.

For material, fence pickets work well, the three in. for deep trays and the two in. for shallow ones. Made in this way 19x24 trays ought not to cost over 75 cents for glass bottomed and less for wooden.

EIKONOGEN AS A DEVELOPER.

By E. M. Estabrooke, New Jersey.

No developing agent has been so extensively advertised as the discovery of Dr. Andresen, to which he has given the above rather euphonious appelation.

This substance, which at first was given to the photographic public in the shape of a reddish gray powder and subsequently (changed and said to be improved) as a light colored or nearly white crystal, has in consequence of said advertising come into very extensive use over a wide extent of territory, and promises very soon to crowd our old friend pyro, from its prominent position as the most valuable and reliable reducing agent for the development of dry plates.

Dr. Andresen has placed the photographers of the world under a great obligation by this important discovery, and there can be no doubt that he will reap a very well deserved reward for his labors in perfecting his discovery, and so promptly placing it on the market and causing it to become so widely known.

Eikonogen as a reducing agent, promises to overcome the most serious objections that have been so long urged against pyro and to be in no way inferior to it in adaptability to the purposes for which pyro has so long held the first position, and in fact from the rapid improvement in the formulæ for its use, eikonogen may yet prove itself to be far more useful and valuable than pyro ever was or could have been.

This new developer, when first given to the public was accompanied by a set of formulæ (supposed to have been originated by the discoverer of eikonogen) which were far from giving a favorable impression of the new reducer and which were in no way adapted to demonstrate to the world the superior qualities which it has proved to possess, and which are being rapidly called forth and developed by better methods of use.

The original formulæ for the use of eikonogen as a developer, were only useful from the fact that they served to prove that the new substance was an active reducer, and to indicate the direction toward which efforts might be directed for improvement, and for a more successful application of its soon acknowledged power as a developer of dry plates.

All the earlier efforts in the application of eikonogen as a developer, resulted in the production of negatives characterized by undue prominence of detail in shadows and a lack of corresponding strength or intensity of the high lights, a flatness or lack of rotundity which even prolonged development failed to cure.

From this peculiarity, claims were made that plates developed by this substance required much less time of exposure, which claims have in time been proved to be unfounded, and it is now a well established fact that none of the reducing agents at present in general use have any superiority over the other in this respect.

The advantages that may properly be claimed for Eikonogen as a developer, are economy and cleanliness, inasmuch as it is more permanent in single solution and therefore may be applied to one plate after another until its power is exhausted, producing negatives of substantially the same character, and also that it does not stain the hands or plate, thus the operator is enabled to develop his plate and afterward to wait upon his customers, with his hands in a fit condition and not calculated to excite disgust and apprehension on the part of those who submit themselves to his manipulation under the light.

Formulæ calculated to bring out the best results from eikonogen are now published by all the dry plate makers and numerous others, and therefore it is hardly necessary to encumber this article with such, as they may be found on every hand by him who seeks.

THE SPECTROSCOPIC EXAMINATION OF LIGHT FILTERS FOR THE DARK ROOM.

By Arthur H. Elliott, Ph. D., New York.

We hear so many peculiarly colored media recommended as screens or modifiers of the light to be used in the dark room, that a little study of the subject will well repay any one for the time so spent.

In the first place, what particular part of the spectrum, of either sunlight or artificial illumination, will affect modern dry plates? It is important in this case to take the more sensitive plates into consideration, and those less sensitive will necessarily not be affected in the light sources that are safe to use with the more sensitive varieties. It will also be well to consider the case of orthochromatic plates.

According to the researches of Eder, Abney and others, modern dry plates of the most sensitive varieties are impressed with light rays as far as the yellow and orange of the spectrum. In orthochromatic plates this range is carried well into the orange, and in some varieties takes in considerable of the red portion of the spectrum. In view of these facts great care should be exercised in the selection of the material used to screen the light source in the dark room. In order to arrive at some definite conclusions with regard to the utility of certain materials now upon the market as moderators of the action of light upon dry plates, we examined the light passing through these substances by the aid of the spectroscope.

The first material selected was the ordinary golden or canary yellow fabric, which is simply cotton cloth coated with a mixture of picric acid and some mucilage (starch) which is readily soluble in water. This material filters out all the blue and violet rays of the spectrum and considerable of the green, but it allows the yellow, orange and red rays to pass, although in a modified degree. Consequently it could be used only for the lower grades of dry plates, that is, those of low sensitometer power. And even in this latter case, as the plates are sensitive in a measure to yellow and yellowish green rays, it is only a question of time under the influence of the light passing through the golden fabric, when the least sensitive of modern dry plates would be fogged in development. Another drawback to the use of this material is the fact that dilute sulphuric and hydrochloric acids,

and even acetic acid bleach it, and then it allows the blue rays to pass through. It is, therefore, important that the covering of the window or lamp does not become splashed with acid otherwise streaks of actinic light will be playing over the surface of the plate under development, and will produce some startling lines of fog. Nevertheless this golden fabric is a very useful one for slow plates; it should be covered with a sheet of glass to protect it from splashing of water or other liquids, and the dish with plates undergoing development should be covered with a piece of brown cardboard, when not under actual examination. If these precautions are taken, the golden fabric gives a very agreeable light to work by.

The next material examined was ruby fabric, which appears to be coated in the same manner as the golden fabric, the coloring matter being one of the new aniline scarlets. The light that passes through this material is only that lying in the red and orange portions of the spectrum. Even the orange light only comes through to a very slight extent, that is, the reddish orange rays of the spectrum. Neither the acids nor alkalies appear to affect the coloring matter of the fabric to any marked extent.

Ruby paper was also submitted to examination. This is paper apparently treated with a similar coloring matter to the ruby fabric, but it has a brownish shade, due to the presence of some yellow coloring matter also present, probably picric acid. As a light filter it cuts off all rays close down to the red and modifies these also. This seems to be well suited to use as a light filter.

In the fabrics and paper the light passing through is well diffused and this action modifies considerably the rays that are transmitted.

We now come to the transparent media, the various colored glasses.

The first of these examined was a deep (orange) yellow glass. This cuts off the larger part of the violet and deeper blue rays, but allows some of the lighter blue, the green, yellow, orange and red to pass. It would, therefore, be useless as a light filter for the dark room. It is not nearly as good as the golden fabric mentioned above, and could not be used even with very slow plates. Yet we see lamp chimneys for dark room lamps made of this glass. It is true that they are recommended to be used with sodium yellow light, but the alcohol or gas that furnishes the

basis of the light, is full of the lighter blue and green rays which this glass transmits.

The next material examined was copper-flashed ruby glass. This is the usual orthodox light filter, and its examination with the spectroscope revealed to us some curious and important facts. On first looking at the light that passed through the prism we thought that only red and orange rays were transmitted, but a closer examination revealed the presence of green rays verging close upon the blue and possibly including a few of the light blue rays. It would, therefore, appear that clear ruby glass of apparently good density and quality of color is dangerous for even moderately sensitive plates; *i. e.*, it transmits green rays, to which these plates are sensitive. It may not be uninteresting to note that this same glass intercepts a large number of the yellow rays, the spectrum showing red, orange, then a dark band, and then faintly the green and possibly the light blue rays.

By using manila paper with the ruby glass the green light apparently disappears, but the red and orange rays are so subdued that the light transmitted is of very little value; in other words, it is too weak for use in the dark room.

Dark amber glass was now examined and this was found to transmit much modified red, orange and yellow light, but the quantity of light passing through is so small that it is very difficult to see at the distance of only one foot from the lamp. This latter defect prevents its use except for orthochromatic plates, and with these there is the danger of the yellow rays affecting the plate if development becomes prolonged.

The last experiments were made with combinations of green and orange glasses, which arrangement we often see recommended. Twelve varieties of green glass were examined, and except in three of the darker shades they all transmitted blue rays, which although subdued were still not entirely intercepted by the orange glass used in combination with green. Of the three varieties which intercept the blue rays more completely, a yellowish green gives the most light, and when used with orange glass it cuts off the blue, green and also the red rays very completely, but leaves the yellow and greenish yellow parts of the spectrum. This combination would be fairly good for moderately sensitive plates, but the illumination is, of a ghastly color, and would require practice in developing under it in order to judge of the density of the negatives.

The two other varieties of green glass which more completely intercepted the blue rays, were of a dark chrome green color. These, in combination with the orange glass intercept, red, green and blue rays very completely, leaving only yellow and yellowish green; but the illumination is so faint that the combination is practically useless.

Looking back over the foregoing experiments, we are led to the following conclusions: For very sensitive orthochromatic plates, the faintest illumination under a diffused light of a brownish red character is alone allowable, and the plates should be exposed to this light as little as possible. The material best adapted to this purpose appears to be the so-called ruby paper mentioned above, the light transmitted being sufficient in quality and of the right character. But for color sensitive plates that are impressed by the red rays, even ruby paper transmits dangerous light and the developing dish has to be covered with some opaque shield, except when under examination. With ordinary plates the ruby paper can be used with the most sensitive, and using moderate care in regard to the exposure of the plate to the light during development, it answers all purposes. The light is agreeable to work by and plenty of it may be used with the care mentioned above. It is always more agreeable to use diffused light than the direct rays coming through transparent media like glass.

The foregoing results have been obtained with a small direct vision spectroscope, and no attempt has been made to locate the light rays transmitted by the various materials used, in regard to the Fraunhofer lines, it being thought that the simple statements given above would be sufficient for practical purposes and more intelligible to the majority of readers.

DRY PLATES IN A DAMP CLIMATE.

Rev. J. M. W. Farnham, D.D., Shanghai, China.

Will a line from this far off land interest the readers of your Photographic Annual?

China is awakening and some of her sons are taking an interest in the sciences, photography coming in for a share among the rest.

About thirty years ago I first landed in Shanghai, but as I re-

member, it was some time later that the first photographers put in an appearance. I had learned something of the art before leaving home, hoping it would help me to illustrate articles relating to mission work. Dinmore Bros. and L. F. Fisler, now of Philadelphia and C. L. Weed, were among the first photographers that I can remember in Shanghai. I was delighted to welcome them, getting, as I hoped, material and valuable hints. They were here when money was easily made and lightly spent. At one time a firm of three divided three or four thousand dollars net gain per month.

I once had a pleasant surprise in meeting Mr. Weed. As I have said he was one of the first photographers in Shanghai, having pitched his tent in the shape of an immense mat shed, on a vacant lot where the Central Hotel now stands. I became intimately acquainted with him, getting material and instruction. Many years later he came again, occupying as a gallery the old Masonic Hall and we again renewed our acquaintance. It was at that time Mr. Weed expressed his dissatisfaction with silver prints and his determination to make a picture that would not fade, and showed me the results of his earliest experiments in photo engraving, which I must say looked hopeful.

After a protracted residence he sold out and left and I heard no more of his whereabouts. A good many years had elapsed when I found myself one winter in San Francisco, ill and waiting till the weather should become mild enough to allow one in my health to visit Northern New England. One day when crossing the ferry from Oakland I saw an advertisement of a Photo Engraving Co., and determined to call and see if I could get any instruction. Reaching Kearney street and finding the number, there sure enough was "Photo Engraving Co." with numerous other signs at the entrance. Ascending many flights of stairs on the upper floor in a room not particularly tidy, I found a man alone, advanced in years bending over his work, deepening the high lights on a plaster cast. I made known my errand, telling him I was a missionary in China, publishing an illustrated religious paper, and that I wished to learn something of photo engraving. "I will tell you all I know," he replied, and looking up he added "I think I know you, isn't your name Farnham?" As he turned his eyes fully upon me, I at once recognized my old friend C. L. Weed!

He made me welcome to his rooms, apparatus and material

and as he promised, told me as far as he could, all he knew about the art.

I remained with him several weeks and have since taught young Chinamen what I there learned of photo engraving and zincography. The Chinese have natural qualifications for this work and will, I believe, excel.

At one time the photographic business in Shanghai was nearly, if not entirely, in the hands of Chinese. There are now several European and one Japanese, besides Chinese galleries.

Since the introduction of dry plates, amateurs have sprung up in every direction. "The China Camera Club" of Shanghai sometime ago had forty members embracing many of the leading professional men in the place. W. S. Emens, Esq., Interpreter and Vice Consul General, is the Treasurer, and a successful manipulator of plates. H. M. Perkins, Dental Surgeon and T. Man, Supt. of the Kiang-Su Acid Works, are both clever amateurs.

Chinese amateurs are also numerous. Our shoemaker, On Mow, can not only make a tasty shoe, but shows his good taste in selecting amateur photography as an amusement.

An up country Chinese amateur was lately telling his experience in photographing Chinese crowds.

He said he had only to put up his focussing cloth and a crowd would be attracted at once. Having previously put in a plate and taken notice of the distance that he might not be out of focus, he would peep through his "finder" and take a shot at the crowd before they knew it. As he prepared to move off they would ask, "Are you not going to take a picture?" "Oh," he would reply "I have got it."

Shanghai, China, 1890.

PAINTING IN RELATION TO LANDSCAPE PHOTOGRAPHY.

By Wilfred A. French, Boston, Mass.

After all that has been said and written, it must be admitted that photography has at last reached the coveted position as an art. But it is evident also, that the results, however beautiful, are produced wholly by mechanical means, for under favorable conditions photography merely reproduces what appears to the

eye—nothing is omitted. Considering the exquisite results in portraiture, genre and landscape which the camera yields us, photography is indeed the most beautiful of mechanical arts, but having certain fixed limitations, it cannot justly be ranked with painting, a theory which some of its most zealous champions are endeavoring to demonstrate.

A fine painting will delight us whether it be a faithful copy of an actual scene or the product of the artist's imaginary powers; in either case it is entitled to be regarded as a work of art. There are many excellent painters, some of whom have achieved distinction, who rely almost entirely on their natural ability; but whether by intuition or by training, they observe the laws of composition, perspective, chiaroscuro and proportion. A knowledge of these principles of art can be acquired by any intelligent disciple of Daguerre, but their application to photography must of necessity be restricted. Yet, fettered as he is, the ambitious photographer finds consolation in the exercise of originality and taste, and his unequaled ability of securing permanent impressions of objects in motion.

No, I cannot admit that painting and photography are sister arts, and for that reason I would suggest that the student photographer, anxious to excel in landscape photography, be cautious in emulating the examples of Claude Lorraine, Poussin, Rousseau, Constable. He can never hope to even suggest the marvelous atmosphere, the dewy freshness, the exquisite coloring, which pervade the works of these masters. As to composition then, there is often too little to serve our student as a model, but it frequently happens that a canvass, in which form is the leading feature, affords him the best opportunity for emulative study. In contemplating a beautiful painting, the photographer will not expect to imitate the azure sky, the limpid waters, the vast stretches of steppe, or the Alpine glow which the painter's art has rendered so marvelously real. Deprived of color, these charming objects would appear extremely monotonous in a photograph, and the effect they were originally intended to produce, would here be entirely lost. They could, however, be separately or collectively utilized by a skilled photographic artist, such as a Barker or a Jackson, so as to produce a pleasing, if not a perfect, result. A favorite theme with many amateurs is a white sheet of water, symmetrically balanced by terra firma, the back ground formed by a shore more or less monotonous, the sky cloudless, and no foreground except the aforesaid expanse of water. The picture tells no story, and it is futile to search for This may, indeed, have been a beautiful the raison d'être. scene, fit to be perpetuated by a Daubigny, but under the conditions described, it certainly was not a suitable subject for the camera. If desirous of carrying away with him a really pleasing souvenir of the locality, the amateur should have chosen a more favorable point of view, one affording some interesting feature as a foreground, a boat, a rock, bushes, tall grasses, or, perhaps, a position whence a peep of the lake through a group of trees could be obtained. If favored with foliage as a foreground, a most picturesque and harmonious combination could have been obtained, even if the waters did reflect a blue sky. Proper exposure and intelligent chemical treatment will greatly modify the chalk-like effect of sky and water. Almost in the same degree as nature abhors a vacuum, a cultivated sense for beauty is offended by a monotonous stretch of clear sky, water or field in a photograph. If some object can be found with which to break up a cloudless sky, so much the better, and an artificial substitute in the printing will not be required. In marine photography one must yield to the inevitable. If the sky is covered with clouds, the corresponding part of the picture will not be without character, and if the day be clear or gray, suitable clouds may be printed in.

In selecting a point of vantage preparatory to photographing a landscape, have an eye on the foreground, keeping a sharp lookout for a rock, a tree, a fence, anything that can appropriately and conveniently be introduced into the picture. If disappointed in your search, and a rural team, or a domestic animal of the large variety be near at hand, try to embody them in your enterprise, thus securing an important adjunct to the picture. There is, perhaps, no more tempting a theme for the camera, than a pretty glade enlivened by one or more glistening pools of water; but unless unusual skill be shown in managing so difficult a subject, the result may not be altogether pleasing. Generally the water shows up as a meaningless white patch, failing, too, in its mission to contribute to the artistic make-up of the picture. However successfully certain mechanical difficulties may be overcome, such a picture has no artistic value, and yet such amateurish attempts have frequently appeared as embellishments in photographic journals. A view of a charming road scene is often spoiled

by being taken immediately in front, when a perspective view would not only have been in better taste, but would have offered the photographer a fine selection of stand-points. In a case like this, the position of the sun should be noted, for with pretty shadows falling across the sunlit road the picture would gain perceptibly in character and beauty.

Learn to regard the scene intended for your camera with a photographic eye. Form and chiaroscuro are about all you can utilize, although so called "orthochromatic" dry-plates will enable you to reproduce color values with tolerable correctness, and to emphasize distant mountains, which ordinarily merge into the sky. If the winds disturb your foliage, and the position of the sun be unfavorable, revisit the spot, unless the picture to be taken is to serve the purpose of a record or an experiment. The writer has often walked miles through the woods, heavily burdened with a dry-plate oufit of fair size, bound for some lovely brook-scene, only to find the conditions against him. Nothing daunted he paid a second, a third, and even a fourth visit to the alluring spot before securing the coveted prize.

In following his favorite pursuit, the amateur need expect but little aid or sympathy from the landscape painter, for, as their interests are not identical, each must rely upon his own resources. Nevertheless the painter can give the photographer many useful hints, and so far as they relate to composition they would prove in the main very useful.

DEVELOPING IN WHITE LIGHT.

By R. M. Fuller, Union County (N. J.), Camera Club.

In these days of catch penny photography, the amateur, with enthusiasm larger than judgment, is often fleeced by the outlay necessary to an experimental acquaintance with many of the alluring schemes, set forth in display headings through the advertising pages of our leading photographic journals.

"Anti frillers"—"Hypo Eliminators"—"You press the button, we do the rest"—"Anti-dark room photography," etc., etc., ab nauseum are commended to the notice and patronage of the tyros who are, so to speak, scooped in by the hundred.

Take the anti-dark room business for example; perhaps some

of the brethren have discovered a practical side to this sort of thing, and are really able to persuade themselves that a great advance has been made in the art by "the discovery."

A friend came into my office one day with a small bottle of stuff which he had acquired at the expense of seventy-five cents, and rapturously explained that he'd got hold of something now which would no longer necessitate the development of plates in a stuffy dark room.

This initial investment was merely preliminary to a further outlay of fourteen or fifteen dollars before he could complete his "outfit." At last he was fully equipped and began operations. Ye gods and little fishes! What a result! Nasty, mud stained negatives, devoid of printing quality—to say nothing of other more important prerequisites to a good positive, and a speedy relegation of the apparatus to the lumber room.

White light development may, however, serve a purpose. It will unquestionably interest a group of friends who drop in on you of an evening, if you are able to take a flash picture of the party, and afterward develop it under white light in the drawing room, so that all present may see the picture evolved, and nothing is more simple than the *modus operandi* of the experiment.

It will cost just ten cents, but the amount of material purchased with this sum will serve to develop all the exposures the most enthusiastic amateur would be likely to make in a year or more.

The process is simply this:

Get a package of scarlet diamond dye from the nearest drug store or grocer. After mixing your usual normal developer (I have used it successfully with both pyro and hydroquinone) add tens grains of the scarlet dye for each liquid ounce of developer.

After exposing your plate take it into the dark room, place it in the tray, pour your developer over it (remembering that enough should be used to submerge the plate at least ¾ of an inch) and immediately bring your tray out into the brilliantly lighted drawing room.

You must be careful in carrying the tray not to tip it, so that the dyed developer will flow off one side of the plate and thus leave it exposed to the actinic light. Should this happen, of course, fog will result.

Transport the tray gingerly until you can set it down with

steady hand on the centre table—perfectly level—and then no matter how strong your light may be, your friends may watch the development at their leisure, and they will scarcely fail to be interested and amused by seeing the image gradually come up to the required state of perfection in detail and density.

When the development has proceeded far enough, wash the plate thoroughly and fix as usual.

It will require a little more washing than you would ordinarily give, in order to eliminate the last vestige of the dye, but you will have a good printing negative—the shadows clear and brilliant, giving a satisfactory print in every way.

As a pleasant experiment for a party of friends, this does very well, but so far as the "great practical value" of this "great discovery" is concerned—anti-dark room photography may be properly consigned—with all the rest of the humbugs incident to catch penny photography—to that part of the creation which, by common consent, is now known as—sheel!

Photography is worthy the earnest, studious devotion of all who admire the beautiful in nature and art, and should be protected by all good men and true from the attempted onslaught of tradesmen who care nothing for it, save as it permits them to sell their wares at fabulous prices, to those whose devotion to the work, unaccompanied by descriminating knowledge, renders them an easy prey.

A SIMPLE DROP SHUTTER.

By F. J. Harrison, New York.

Being in possession of a very simple and readily made drop shutter, and the same proving very effective, I have thought that a general description of it might be of interest to readers of the International Annual.

The accompanying cut gives a good idea of the shutter. A thin piece of wood with a hole bored just smaller than the lens hood, and with grooved pieces on the sides and bottom, forms the basis of the shutter. A sliding piece moves freely up and down the grooves, and is bored at the centre with a hole of the same diameter as that in the back piece. On the upper end and behind this back piece, is fastened another piece of wood as shown in the side cut, and in this is bored a hole exactly fitting the lens hood.

The hood thus passes through this, and fits tightly against the back piece.

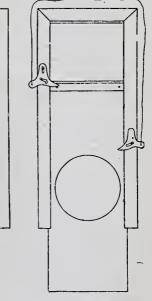
At the lower end of the sliding piece, is nailed a narrow strip of

wood carrying two small nails

to serve as projectors.

On the left hand side of the shutter, a small piece of brass, shaped as shown, serves as the release catch. This moves freely upon a screw, this latter being so situated that the catch always tends to fall inwards. A small slot and a pin, prevents the too great displacement of the release catch.

The time catch is on the other side, and by means of two slots and pins, is arranged so that it cannot fall backwards or forwards when not in use. When in use, it is in the position shown. On pulling it aside, it falls downward a little, and is thus held immovable until raised by the hand. This obviates any difficulty that may arise from for-



getting to look at the time catch when wishing to work instantaneously.

The two catches are joined by a single thread, thus enabling the operator to work quite comfortably from one side of the camera, there being no danger of the thread on the opposite side being blown about by the wind.

The advantages I claim for this form of drop are, that it is absolutely unbreakable when closed; that it is very small, its length being only about three and a half times that of the diameter of the lens hood, and that it is readily set for instantaneous exposures, while the time attachment is quite out of the way until required.

IMPURITIES IN WATER AND SOME OF THEIR EFFECTS ON PHOTOGRAPHIC CHEMICALS.

By George E. Harrison, Devonport, England.

Water on account of its solvent properties is never found in the pure condition in nature, and even water purified by chemical methods almost always contains slight traces of impurities, owing to the solution of the vessels employed to contain it; hence it has been called the universal solvent, and well it deserves its name.

Let us see in what way water manages to become contaminated. When water falls as rain, in its passage through the air, it dissolves some of the more soluble gases with which it comes in contact, such for instance as ammonia, traces of nitric acid, small quantities of oxygen and carbonic acid, and if it falls through air in the vicinity of manufacturing towns, it may contain local impurities such as hydrochloric, sulphurous and sulphuric acid.

Then water in sinking through the soil, becomes laden with the various salts it has met with in its passage; this water, meeting with impervious strata, comes to the surface again in the form of springs.

Spring water will be found to contain most of the gaseous impurities of rain water, and besides these, all the mineral impurities it has dissolved in its passage through the soil.

The most ordinary impurity in spring water, is chalk or carbonate of lime, which gives to water the property known as "hardness," a hard water, being water containing lime and magnesium salts in solution.

River water, although it contains a good deal of spring water, has generally a smaller quantity of dissolved solid matter in it; this is due to the fact that river water is largely diluted with surface water which contains very little dissolved solid matter. In river water we usually find a greater proportion of dissolved organic matter, derived from drainage discharging into streams and also from decaying vegetable matter. This organic matter in course of time becomes oxidized by the oxygen dissolved in the water and gradually converted into nitrates, nitrites and ammonia. We thus see that it is impossible to have such a thing in nature as pure water.

The chief sources of water used for domestic purposes may be classified as follows:

THE HORSE TRADE.

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- (1).—Rain water, collected from the roofs of houses, etc. This in the country is generally pure and soft.
- (2).—Water from shallow wells. This is nearly always bad and is generally very much contaminated with sewage.
- (3).—Springs. The water obtained from these is usually very hard and free from organic matter.
- (4.)—River water, which has been filtered, has the disadvantage of having been at one time contaminated with sewage and other impurities, and usually contains small quantities of these.
- (5).—Water from deep wells, which is generally free from organic matter impurities, but very hard.

METHODS OF PURIFYING WATER.

Gaseous impurities can be got rid of, by boiling the water for some time; this also tends to kill many of the organisms to be found in water.

Dissolved salts, such as calcium carbonate, calcium sulphate, sodium chloride and magnesium sulphate, can only be got rid of by distillation; that is, by converting the water into steam, and condensing the water vapor by cooling it. This is conveniently done in a copper still, provided with a tin or copper worm; lead should be avoided, and the still used for no other purpose.

Suspended matter may be got rid of by filtration. Ordinary water should never be employed in making up solutions of chloride of gold or of nitrate of silver, owing to the presence of organic matter in the water. The nitrate of silver solution will soon darken in color, and the chloride of gold will deposit after some time a brownish precipitate of metallic gold, due to the reduction of the chloride of gold by the organic matter in the water.

The ferrous oxalate solution should be made up with distilled water. If ordinary water be used, especially if at all hard, a cloudiness will appear, due to the production of insoluble oxalate of lime, formed by the action of the lime salts in the water, upon the ferrous oxalate.

If the potassium or ammonium bromide solution be made with ordinary water, a fungoid growth usually makes its appearance after some time in the solution. This can be avoided by using distilled water.

My advice is that all solutions be made up with distilled water (if not available, well boiled rain water), your solutions

will then keep of a constant strength, will remain perfectly clear, and if kept in good glass stoppered bottles, will never deteriorate.

LANDSCAPE ENLARGING.

By J. H. Harvey, Secretary Amateur Photographic Association of Victoria, Melbourne, Australia.

The subject of "enlargements" as regards apparatus, light, etc., was treated in a most able manner by Mr. J. Traill Taylor, in the British Journal Almanac for 1888, but very little was said in reference to the enlarging process. In the present paper, the intention is to mention some of the recognized methods of enlarging, and from these to select that which best meets the requirements of amateurs, when architectural and landscape work is in question. When the word "enlargement" is mentioned, probably ninety per cent. of those amateurs who have taken up photography during the last five or six years, see the bromide print in their minds' eyes, and it may interest some of these to hear that other methods exist, by means of which large prints from small negatives may be obtained, and that some of these modes are not much more troublesome or difficult to work, than enlarging on bromide paper.

This material undoubtedly lends itself to the production of results which delight the eye of the artist, and leave little to be wished for, provided the manipulations have been well conducted, and both negative and subject suitable.

Broad effects of light and shade, in which the value of detail is of secondary importance, are excellently rendered by it. Good results may also be obtained from negatives, which, under ordinary circumstances, would be worthless for enlarging purposes, and in these cases it is the most convenient and perhaps the best material to use.

Enlargements in carbon, collodion, or gelatino-bromide upon opal glass, are more suited for portraiture. Collodion transfers, which were very fashionable some years ago for portrait work, are collodion prints made upon glass from small negatives, and after development and fixing, stripped from the glass, being transferred to paper having a coating of gelatine. The transfer paper used in the carbon process was extensively pressed into

the service as a final support. This process has not been used to any extent other than portraiture, and has indeed become all but dead.

The system which is now introduced to the notice of amateurs, is that in which an enlarged negative is made. There is nothing new in this, as, before the advent of gelatine, it was a matter of every day work in some establishments, and is still used by many; for example, the Autotype Company of London, and others.

The advantages of this style of working over that of enlarging direct are:

First.—Having obtained an enlarged negative, the amateur may at any time print a copy from it by contact in the ordinary way, without going through the enlarging process again.

Second.—The amount of detail secured is very much greater, and the definition much finer than in enlargements made in the usual manner by means of a lantern and bromide paper.

Third.—If the mode adopted be that recommended, the maker has a transparency which can be backed up with mat varnish or ground glass, and hung against a window, or a number may be used to glaze a window which happens to open into any uninteresting place, such as an area or passage. Daylight is preferable for the work, and the exposures are short; half a dozen distinct exposures may be made in less than an hour when the apparatus is in order. The time occupied in preparing my enlarging apparatus for work is about half an hour, and then I can "go on until further orders," merely inserting a fresh negative at the small end after each exposure, which is the work of only a minute or two, as with the same amount of magnification no additional focussing is required.

There are two methods of work in connection with the making of large negatives. First, that in which a transparency in carbon, collodion or on gelatine, is made by contact from the small negative, and the transparency copied to a large scale, thus producing the enlarged negative. In the second place the original negative is placed at the end of the camera and an enlarged transparency made; this is afterward put into a printing frame, with a sensitive plate in contact and the enlarged negative printed.

In the first case, undoubtedly the best results are obtained when the transparency is made in carbon. The carbon image partakes more of the character of a stain than a granular deposit, the particles of which it is composed, being so exceedingly fine that they are not magnified to any appreciable extent in the enlarging process; on the other hand some sorts of gelatine plates show such a coarse grain, that the enlargement of the particles of reduced silver is very evident, and not only does the sharpness of the enlargement suffer, but the number of the tones which form the image is fewer. The process which I recommend is the second; I have used it for some time, and although the most expensive, it has strong redeeming feat ureswhich I think outweigh the item of cost.

My enlargements are made generally $8\frac{1}{2} \times 6\frac{1}{2}$ or 10×8 and are from stereo. or $4\frac{1}{4} \times 3\frac{1}{4}$ negatives. The negative is placed in a carrier at one end of the baseboard and the $8\frac{1}{2} \times 6\frac{1}{2}$ or 10×8 camera at the other, the interveining space being light tight, and the negative carrier being perfectly square with the camera; a five inch focus, Ross' portablesy mmetrical lens is used and the usual working aperture is about 1/45, being the number four stop.

The whole is bolted to a studio stand with a ball and socket joint at the top; it is then turned up to the sky (away from the sun), and the plate being inserted, an exposure of say thirty seconds is given if the light is good and the negative of average density and clear. The plate is developed in the usual manner with alkaline pyro, the development being continued until the transparency shows every detail as solidly as the negative. (Those who have been in the habit of printing window transparencies will understand the character of image necessary.)

After copying and clearing, the plate is dried and placed in a printing frame with a gelatine plate at back; this is exposed the requisite time to gas or kerosene light at a distance of a few feet, so as to avoid blurring, which might be caused by any chance irregularity in the surface of the glass preventing perfect contact. This plate is then developed as an ordinary negative, the precaution being taken to reduce the quantity of pyro slightly, as if the same strength as would be correct for a direct negative be used, the image will develop too hard and chalky.

We now have a negative which may be utilized in obtaining silver, carbon or platinum prints (or if a little less vigorous than is correct for these, bromide paper comes to the rescue), and in cases in which the enlargement is not greater than two or three diameters and the original negative is exceedingly sharp and possessed of fair gradation, an expert would hardly detect at first sight that the prints were from an enlarged negative, which is more than can be said for direct bromide prints made by the aid of the enlarging lantern. It must be understood that to get the best results, the original negative must be a first class one, the enlarged transparency must be properly exposed and carefully developed with judgment, and the second negative likewise.

Another advantage we obtain when making an enlarged transparency will be apparent, when it is considered that any accidental defects in the original negative are transferred to, and show in the transparency, and these together with others which may exist in the film upon which the transparency is made, are reproduced in the negative on an enlarged scale if the transparency is a small one, so that we get two sets of imperfections magnified; whereas, in the other method, we have only one set enlarged, any imperfections which may be due to mechanical defects in the transparency plate being merely copied the same size in the negative (and these may be touched out before making this second negative).

These points are, I think, sufficient to justify us in going to the expense of an extra large plate, which costs only a few pence, and, as it is only our best and most interesting negatives which we enlarge, the annual cost of the large transparencies would not amount to an exorbitant sum. Anyone trying this system will, I am convinced, be fully satisfied with the results, and if successful, will find himself a master of the mode of obtaining enlarged prints other than bromides, and which may, for many purposes, be more suitable than these.

QUALITY.

By J. Hubert, England.

"Light, more light," is still the cry, ever and anon flashing forth amongst photographers in England and abroad.

Leaving alone for the moment the question in its figurative sense, it seems to me we have quite enough of the artificial sample as far as quantity is concerned, but "quality, quality," there must be something in that, as the cheesemonger reminded me, when, since my becoming friendly with the secretary of an important microscopical society, I happened to look suspiciously at a "cheesy" sample which I fancied was taking advan-

tage of the dim twilight, to stroll across the board, evidently endeavoring to join a rasher of bacon, which seemed to me on the same errand bent.

I interested myself in "quality" then, but though I was momentarily rewarded with seeing quite a new world before my eyes, my friend threw cold water upon my efforts by cooly remarking: "Seen them before, and finer specimens."

Looking upon it in that light then, I suppose I must not be disappointed if, after reading this, somebody exclaims: "Seen it before." However, to such claimants I would make the rejoinder, "Why did you not publish it then?" True, it might be thought there was not enough to publish, but in spite of all, I will just venture to say a few words, not upon a progressive "quality," but upon that undefinable something, which takes its place and comes nearest to perfection.

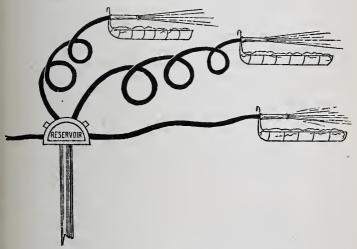
It has been a mystery to me that with such a powerful agent as the flash light (judging from results already achieved), nobody has as yet exclusively devoted himself to the study of the subject in order to bring about a really useful apparatus, the essentials of which (not difficult to attain, so it seems to me), consist of perfect immunity from danger, instantaneity of action, very bright illumination during the whole of the operation, so that the actual flash can scarcely be noticed, and lastly, the trapping of smoke.

As the occasional tendency exhibited by explosive mixtures, to prepare little surprises in the shape of blowing themselves up prematurely, and often in company with the operator, who starts them on their fatal journey, counts somewhat against their employment, I am inclined to favor the blow through plan, but in a slightly different way to that used heretofore.

To one of the high pressure oxygen cylinders I attach with a fine wire, a strong piece of India rubber pipe, which leads to a reservoir (serving to distribute the oxygen equally), mine is a 2½d. tin lamp with four or five holes drilled into it, to each of which a piece of lead pipe is soldered. After securely tying the rubber pipe with wire to the reservoir inflow pipe, I proceed to attach in same manner the branch rubber tubes to the lead pipes soldered in the reservoir, leading them then towards and fastening the same to the lamps. These may be merely pieces of lead piping with strong wires soldered thereto, but projecting underneath, with hooks to hang them conveniently. Gauze wire is a

good material to lead over and over with some cotton wool inside, for the purpose of holding the methylated spirit in this manner.

But these trays holding the spirit, must be wide and long enough, as well as fixed several inches below the pipe to prevent



waste, by the spread of the powder in all directions. The spirit lamp thus ignited, the powder has to run a gauntlet of fire in which it (unlike when it passes through disconnected lamps) increases in heat, until it is perfectly consumed before emerging. With a sudden turn of the key, a quantity of oxygen from the iron bottle is now passed through (strong rubber pipes, well fastened with wire, everywhere are a sine qua non) giving, by dint of the great pressure, a practically instantaneous blow to any number of lights, at the same time supporting perfect combustion as well as enhancing the quality of the illumination considerably.

One of the branch pipes may of course be fixed to the pneumatic shutter belonging to the camera, so ensuring simultaneous exposure with the flash, to the still further security of which advantage, a drop shutter can be made use of, if the flash is sufficiently brilliant.

It is a matter of the greatest importance to keep a very bright

light burning, to prevent the painful disturbance of the pupil of the eye, which immediately contracts upon the bright light reaching it. Moreover it will also be found a great help in focussing.

The trapping of the smoke presents by far the greatest difficulty, but can be overcome by a sort of forge arrangement, fitted over the flame in precisely that locality where by experiment it is found that the volume of smoke ascends. doors made to act in unison (somewhat after the manner of the rams of a four-in-hand coach), drawn over the opening, directly after the flash, answer well. I proved the efficiency of this arrangement at one of our photographic societies a few years ago (the idea was afterwards patented by a gentleman then present) by asking one of the members to ignite a charge, when I allowed the cloud of smoke (before it had expanded too much), to ascend into a tall silk hat held by me in readiness, covering it quickly afterwards with a photographic periodical. Not one particle of the smoke escaped me, but it did burn the lining of my hat. Moral.—Line hats, used for experimental purposes, with tin; in which case you may even use them for preparing an emulsion.

A great deal has been written and said about the necessity of diffusing the light by means of tissue paper or some other transparent material; but however that may be, I have taken portraits and also large groups, where that ghastly look (generally held to be accompanying the non-use of a screen) was entirely absent, and as I hold "What man hath done man can do," I am inclined to think it is not an absolute necessity, when the requisite diffusion can be obtained by removing the illuminant to a sufficient distance from the object.

In conclusion, I am bound to say that flash light photography has fallen somewhat into disrepute in this country of England, and it will indeed want an ingenious piece of mechanism, to rescue it from the contempt in which it is held by the all powerful head of domestic economy, who will never permit another attempt at "dust powder" photography, if she has witnessed the effects of one.

Will not then, some of our American readers take these hints and send us over something that will combine all the necessary features without the usual "high coloring" applied over there?

"ON TOUR AND AFTER."

By E. Howard Jacques, England.

In last year's ANNUAL, under the heading "On Tour," I endeavored to give a description of a simple form of changing bag and appurtenances, coupled with a little advice to the amateur when "out on photographing bent." In it, I advocated the use of C. P. filter paper as a suitable substance to place between the plates when packing. Certainly plates protected by it, are rarely injured by friction, but if it be used, scrupulous care must be taken that it is not allowed to absorb noxious fumes. or it will certainly mark the plates.

On this score it may with advantage be abandoned in favor of fine, grass dried, tissue paper, but even this should not be allowed to remain exposed to a strong light, and it must, of course, be quite dry.

In depicting street scenes or, in fact, any subject of which moving objects form part, some reliable view meter should be used, that is, some arrangement whereby the operator can see the actual subject and the position it occupies upon the plate at the time of exposure.

Complicated devices of all kinds should be avoided. For simplicity and effectiveness, the arrangement I will describe, has for years past answered my requirements with exactitude and cannot I think well be excelled.

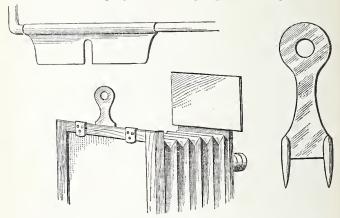
To make it, proceed as follows:

Set up your camera and with your R.R. or other lens suited to the purpose, focus sharply some fixed object, covering the screen at a distance of thirty yards. Now, take a piece of cardboard, say two inches by five inches; about one inch from the end, cut out a circular hole one-third inch diameter.

Carefully observe what part of the object occupies the extreme top (centre) of the screen, then taking the piece of cardboard, hold it flat against the back of the screen, but projecting above it, place the eye to the aperture and raise or lower the cardboard until the eye can only just see over the top of the camera front, the particular part of the object noted upon the screen. This done, mark the card accurately at the point "A," shown in the accompanying sketch, and cut off the surplus.

The proper measurement having now been obtained, a standard eyepiece can be cut out of sheet brass of the shape "B" (tak-

ing care the sight hole corresponds with that in the card), and two tapering wire plugs are soldered to it, "C." Next, neatly drill two holes in the centre top of the camera back at "A," for the insertion of the plugs, and the sight piece is complete.



Some strong brass or iron wire is next taken and bent into shape "D," to form the boundary lines of the view, the size being determined by observation of the object upon the screen and through the eyepiece.

To the bottom of the wire frame must be soldered a piece of brass "E," drilled or cut for the insertion of a binding screw to the camera front.

Both parts are now easily fixed or removed at pleasure and may be blackened with Brunswick black.

As the lens projects beyond the front and frame, so will the frame be smaller in proportion to the screen.

The advantages of this device will be at once apparent. The actual object to be photographed can be seen and caught to the best advantage and that upon any part of the plate, at the will of the operator. With a little practice there is no difficulty, no fear of finding half a yacht or steamer or a decapitated horse or cow revealed upon development.

In taking street scenes, fair composition can readily be obtained by watching the traffic, until the objects are so placed upon the field of view that, satisfied, you "pull the string" or "squeeze the ball."

I need scarcely add, a similar arrangement is suited to hand cameras.

On the conclusion of a ramble it would be hazardous to guess how many plates are spoilt by over eagerness to render the latent image visible. To quote an instance, a neophyte, a respected friend, managed to expose forty-eight half plates during a three hours' visit to a picturesque village and naturally returned home fatigued with his exertions, nevertheless all those plates were rushed through, and at ten the next morning, forty-eight miserable failures were shown me as the result.

Time and experience, bring patience and discretion, wonderfully limiting our exposures; then there is more satisfaction in taking the camera on tour and after.

HAS THE DEVELOPER OF THE FUTURE COME? By Dr. John H. Janeway, U. S. A., Bernicia Arsenal.

I have lately heard so much of the developer of the futurethough there seems to be some difference of opinion as to what it really is-from the ever enlarging hosts of the amateur, and especially the youngest, that I have been compelled, in order to comply with your request, to ask the above question. Now how shall we obtain the desired answer? Will a look back into the past of photography give us the desired information? I fear not. We all know, or should, that the first substance used, by which Daguerre developed the image on the plate, was petroleum oil, and then that a happy accident led him to use the vapor of mercury, which continued to be used as the developer as long as daguerreotypes were made. In 1850 a new substance, offering many and great advantages over all previous processes was introduced, and was not long in coming into general use. refer to the collodion or wet plate, which necessitated the use of an entirely different developer and management. The photosulphate of iron solution was for a long time, the only developer used. In the light of those days it was thought to be the perfection of photography. But after awhile, and in response to the labors of many ardent workers on both sides of the Atlantic, the gelatino-bromide or dry plate appeared, welcomed at first by a very few; by its merits it soon gained favor, and has at last almost, but not entirely, banished its predecessor. When the

plate makers were few and the formula for their production was almost identical, the ferrous oxalate was considered the sine quo non developer. The reason is obvious; the operators knew the plate, its rapidity and requirements; but when the demand increased greatly, plate makers became abundant, and each, by raising the formula of the emulsion, endeavored to obtain greater rapidity, etc., for their plates over rival makers, and thus to increase their sales. Then began what may be called the war of the developers. Pyro, which had been used in the wet process, again came forward as the great reducing agent and came to stay; and which, despite its many objectional qualities, seems still to possess large staying properties. It is needless to mention many other substances that have been advocated only to be lost sight of, but there are at present two other claimants for the honor, which demand our attention. Hydroquinone, which was hailed enthusiastically as the one that would drive pyro into deserved obscurity, if not disgrace—a universal developer suitable for all kinds of plates, all kinds of exposures and all kinds of operators, came rapidly to the front. That its claims were not filled is evident by the quick appearance of another, viz.: Eikonogen, and which is now, after the blast of trumpets, undergoing the process of grinding and sifting, so necessary for the survival of the fittest, but still not sifted enough to fully understand its qualities, good or bad. But this hasty resumé does not seem to give us the desired information, for there are many who still cling to the ferrous oxalate with a strong love and will, others again will use nothing but pyro-both classes excellent and long tried workers. The balance are divided between hydroquinone and eikonogen, with a large percentage who are quite uncertain which of the two are the best and frequently mixing the two. There are so many factors in the way that I think—in fact am positive—that up to the present, an affirmative answer to the question cannot be given. When we consider that no two brands of plates are alike in either their chemical constituents, mode of production or requirements, is it possible that one set formula for a developer will produce the same effect upon both, and the same result be obtained? To prove this take a sample of four brands of plates. expose them under as identical circumstances as possible-time of day, length of exposure and lenses of the same focus and rapidity—then cut each plate in four parts and develop them simultaneously—in ferrous oxalate, pyro, hydroquinone and eikonogen, and note well the result. One brand of plates will give the best results with the ferrous oxalate, another with pyro, another with hydroquinone and another with eikonogen. And then, again, strange as it may seem, it will be found that for some kinds of work, some one of the above developers will give better results, no matter what brand of plate is used, for that especial work. Doubtless each one of the above developers will give a result upon applying it to the exposed plate, but that is not all that is wanted. It is perfection, or as near perfection as can be obtained, that should be aimed for. There is a lesson taught here—choose and use the developer best suited to the brand of plate in use. And until all plates are made by the same inflexible formula, no universal developer will have been found.

CYCLING AND PHOTOGRAPHY.

By Arthur J. Leeson, England.

When people take up cycling, in ninty-nine cases out of a hundred they become enthusiasts, and the same may be said of those who practice photography. These two pastimes combine very well. The former is a healthgiving, bracing exercise, and the latter is instructive and fascinating; while together they form a delightful pursuit far above anything a non-cycling photographer can imagine.

The cycle in the rude form of the old Dandy horse, dates from the beginning of the present century and it was not till nearly thirty years ago that the hobby horse was superseded by the bone shaker—so called from the fact of both wheels being made of wood with iron tires, and being springless, made vibration something to be remembered. Gradually, however, vast improvements have been made until the modern cycle is as near perfection as could be desired. In fact, what with elaborate springs and inflated rubber tires, it has become quite a safe medium of conveying the photographic kit.

When a pedestrian has a large camera to carry about, the weight soon begins to tell, especially if it be hot, sultry weather. For then a few miles walk, makes one feel fatigued and little inclined for work; and that a lounge under the shadow of a tree would be much preferred. If the train is taken, many lovely

bits are missed and one is, perhaps, taken right away from that which should be the centre of operations. And again, it is not always convenient to have a porter with one, even if the purse is equal to it. What can be more enjoyable than to take a tour—long or short—on a cycle, with photo kit ready to be brought into operation at any moment, as a scene strikes one? A few miles is as nothing, and the heart of the country is reached in a very short time. In choosing a companion for a tour it is important that he should have like ideas and sympathies with one's own. If it is not so, it may result in anything but satisfaction to both parties.

There are many different ways of carrying the luggage. Some cyclists use the tricycle, which with a few special fittings to prevent undue friction between the camera and the other et ceteras, is admirable, as with this machine, a few extra pounds weight is of no account. There are several in the market which suit the photographer exactly; but in this short paper it would be scarcely wise, perhaps, to mention any one make in particular—the price lists of the different manufacturers, giving all that is needed.

Since the safety bicycle has become so general, many ways of carrying the kit has been devised by obliging makers. This form of cycle has the advantage over the tricycle in being more compact, lighter, takes considerably less room in storage, and can be ridden where tricycles cannot.

The writer rides a fifty-three inch ordinary bicycle and carries his half plate (and sometimes his whole plate) camera in an M. I. P. bag made for the purpose, on his back, with the tripod strapped to the handle bar. With the camera, are the tripod head, lens, shutters, cloth, etc., not forgetting when on a long journey, some fruit. In another bag are three double backs which is thrown over the shoulder on the other side. Cyclists are often very bigoted, and each thinks his machine the best. But undoubtedly the tricycle is the best machine when much luggage is required to be taken, as an extra change of garments can with ease be stored for use when the day's riding is over, or if one should be caught in a heavy shower.

It is a great advantage to all cycling photographers to belong to the *Cyclists' Touring Club*. This organization, which has its headquarters in Fleet street, London, and of which Mr. E. R. Shipton (who is himself a very enthusiastic amateur photographer) is secretary, has nearly 22,000 members scattered all over the British Isles, Europe, America, etc. This club has in nearly every town and city, an agreement with the best hotel in the place to supply the members on production of their ticket, with lodgings, board, etc., at considerably reduced rates. There are also some hundreds of hotels where a dark room or cupboard is set apart for members to change their photographic plates, being provided with ruby lamp, etc. This great advantage is at once apparent. "Chief consuls" are appointed, from whom all information respecting roads to be traversed, can be obtained gratis. "Consuls" are to be found in every town, who are always ready to help the tourist to the best of their ability. A "Gazette" which contains much valuable information, records the doings of the club and is sent to every member monthly. Hand books, road books, maps and other literature are published for the benefit of members, besides many other advantages; all for the small fee of two shillings and sixpence per annum. increasing popularity of cycling, as combined with photography is spreading on every hand and a more elevating and pleasant hobby than the combination of the two, it would be impossible to find.

SOME PRACTICAL NOTES ON THE RELIEF HALF TONE PROCESS.

By Max Levy, Philadelphia.

The history of the photo mechanical processes, is as old as that of Photography—more varied and more interesting. Since the beginning of photographic discovery and research, efforts have been made to multiply the product of the camera by the facile means of the printing press, and the advance in this direction in recent years has even outstripped the phenomenal progress made in the realm of photography proper. In every direction, photography has been applied to the mechanical methods of printing, and we have resulting, such varied and beautiful processes as the "Heliotype" or "Lichtdruck," the "Photogravure" or "Intaglio Half Tone," "Photo Lithography," "Photo Chromotypie," "Photo Gelatine Relief," "Photo Zincography" and Relief Half Tone, (cross line or half tone process, as it is called, "Autoglypie"). Among these varied methods,

one of the most interesting and undoubtedly the one destined to the most universal application is the Autoglypic, or the Relief Half Tone process. By the Autoglypic process is meant the method of producing a plate for the typographic press through the intervention of photography. Such a plate must consist of a smooth surface, very finely subdivided by depressing certain portions so that they shall receive no ink from the rollers in passing over the surface. Ordinarily in printing, we have to deal with one positive color and a positive white for a ground; all the various gradations of light and shade composing the picture must be obtained by the distribution of the color in finely subdivided particles, in such a manner that more of the white surface shall be covered with the color in the parts representing shadows, and less in those parts which represent half tones and high lights; the color in itself always remaining the same. The subdivisions into which the surface is to be cut up, must always be so small as not to interfere with the rendering of small details in the picture, and at the same time so large as to not too readily fill up with ink in the depressed spaces. This method at its very outset presents itself in two entirely different phases, differing greatly in the means by which the results are obtained. The distinguishing feature is, that while in one of these phases the printing surface is subdivided into an irregular mottled or grained effect, in the other, it is broken up into lines, cross lines and dots, regularly disposed over the entire surface, but of course differing in the amount of the surface, exposed to the rollers and impact upon the paper upon which it is to be printed.

In the latter method the subdivision of the tones of the photograph into lines and dots, is obtained in the negative, and it is with the making of this negative that I propose to deal in the present paper.

Attempts have been made from time to time as far back, to my knowledge as 1864, to obtain these subdivisions by mechanical means, which I shall not here attempt to describe; but the first published attempt, of which I have any knowledge, to attain this end by purely optical means, was the patent of Meisenbach, of Munich, in 18—. Meisenbach's method consisted in imposing a transparent positive of the subject to be engraved, upon a sheet of glass covered with diagonally ruled lines, alternating opaque and transparent, and re-photographing this positive and ruled screen together, and reversing the direction of the lines upon the

screen by inverting the screen itself after about one-half of the exposure is completed. This method is still in use in many establishments, but it offers among others these grave practical difficulties: First, That the screen or ruling itself, requires to be copied with equal sharpness throughout, and further, that the relation of the distance between the film of the positive and the ruled screen and the lens of the camera, requires very nice adjustment, as in this case, a very small lens aperture, must always be used to obtain sufficient flatness in the field to make the tendency of the lines to run into dots, perfectly uniform throughout.

A great improvement over this method is to insert the glass with the ruled lines (grating I shall call it) into the place in the shield occupied by the slide, after the latter has been withdrawn, and after about one-half the exposure has been completed, the lens is capped, the grating carefully withdrawn and replaced in an inverted position, so as to reverse the direction of the lines; the exposure is then completed. This method offers great advantages over the former. First: The grating is copied in contact and its sharpness has no relation to the focus of the picture, or the capacity of the lens, and furthermore the cross lined negative may be made directly from the copy, without the intermediate negative and transparency required by the Meisenbach process.

Another great improvement even on the last method described, and which is in use by those producing the highest class of results, is to use a grating ruled with opaque lines crossing each other in two directions at right angles, and inserting the grating immediately in front of the sensitive plate, as in the method above described with the single lined screen. Success in this work will depend entirely upon two things, the possession of a screen ruled with perfect regularity, of sufficient fineness and with the proper relation of the opaque lines to the spaces between them and on the way in which this screen is used, but principally upon the first requisite, which is all important.

In the directions which follow, I shall only refer to the use of a grating with opaque lines crossing each other at right angles, as the main points of this method are applicable as well to the use of the single lined grating. To begin with, I will describe minutely the grating itself. This must consist of a very flat and perfect piece of thin crystal plate glass, covered over its entire surface with opaque lines, say about 120 to an inch, and ruled

diagonally at an angle of forty-five degrees to the sides, and in both directions crossing at right angles. These lines should be of such a thickness that the transparent squares between them are from three to five times as great as the thickness of the opaque line itself; the side containing the ruling, however the latter may be done, should be protected by a thin cover glass, so that it can be thoroughly cleaned without injury to the lines. The best gratings are ruled directly upon the glass, but good results can be obtained by the use of gratings made by photographing a printed ruling, if the photographing be carefully done, and on wet plates only.

The gelatine film of a dry plate obstructs so much light that gratings made in that way are utterly useless for direct work and

extremely impracticable under any circumstances.

Assuming the operator to have at hand a suitable grating, as above described, we are ready to proceed to work. Any camera will do, though one with a "Benster" or "Bonanza" holder is always to be preferred; but the lens should be of the w. a. or rect. type, and although the work can be done with dry plates of low sensitiveness, the wet is to be preferred on account of facility and cheapness, as well as the greater crispness of the wet plate result.

Having put up the copy, flat upon the copying board and focussed sharply, the next thing to be done is to put the grating (which has been first wiped perfectly clean) into the holder or pit, exactly as if it were the sensitive plate. If the holder is of the "Benster" or "Bonanza" style, two moderately thin silver pins may be driven into the upper and lower guides, to serve to separate the grating from the sensitive plate. After being carefully drained of all superfluous silver solution, it is put into the holder immediately back of the grating, but separated from it by silver strips or pins, as before described and is then ready to expose. Let us diaphragm the lens to its smallest aperture and expose about twice as long (if the grating be as transparent as clear glass in its whites) as for an ordinary copy. The plate is developed and it is found to contain a picture and a sharp, clear tracing of the grating, only, of course, in reverse, i. e. a negative of the original. If this negative is intensified and printed from, the result will be extremely FLAT; the lights will be too dark, as they will consist only of black lines crossing at right angles and the shadows will in all probability be too light. Now let us try

another plate. This time we will use nearly the full aperture of the lens. Upon development we find that the grating is almost, if not quite, entirely absent from the picture and the copy is nearly as if no grating had been interposed. If a good, "rapid rectilinear" lens is used it will be found that with the present adjustment of the grating, an aperture of about F. 18 to 24 or 30 (depending on the nature of the subject, as will be described further on) will be found to render the lines sufficiently sharp and still leave a tendency to eliminate them in the high lights of the picture, just about sufficient to leave the portions where the lines cross each other, quite clear glass. The variation of the angles in which are refracted rays of light, passing through the glass of the grating from a lens, is, of course, greater or less as the aperture through which the rays pass, is greater or less, and more or less action will take place around or across the lines in proportion to this aperture, and the comparatively small deposit of silver that is present after development in a properly made half tone negative, is afterwards increased by a full mercury intensification, so that in the high lights in the spaces between the points where the lines crossed, the deposit is quite dense and black, leaving only small transparent dots. Exactly the same effect of the sharpness and elimination of the grating, is noticed with any given lens aperture, upon changing the distance between the sensitive plate and the grating; that is, the grating is rendered more sharply as it approaches the film, and less so as its distance is increased, and with the distance of the grating from the sensitive plate and the lens aperture properly adjusted to the nature of the lines upon the grating, the tendency to run into dots in the high lights or "close up" the lines will vary with the length of the exposure. Thus with a "soft" print, toned to a blue or gray color that would copy "flat," a larger aperture may be used, which will increase the contrast of light and shade, and per contra, with a harsh or very red toned print, a smaller aperture will help matters by keeping the lines "open" in the high lights for a sufficient length of exposure that some action may be had in the deeper shadows.

By a careful regard for the effect of the lens aperture, I have often succeeded in getting half tone plates from very "flat" photographs, and beautifully "soft" results from harsh prints.

All the points that I have given above for copying directly

All the points that I have given above for copying directly from a print, apply equally to working from transparent positives by transmitted light.

I have great hopes of success in a direction in which I am now working, with a view to making a cross lined negative directly from a sitter or from nature. I feel sure I have already greatly exceeded the space you can allot to me, although I have barely entered the threshold of the general aspect of this extremely interesting subject, and while I have written still far beyond midnight, I feel that I might continue indefinitely upon this one theme, so varied are its phases.

THE DEVELOPMENT OF AN AMATEUR PHOTOGRAPHER.

By George A. Nelson, Secretary, Lowell Camera Club.

A truly successful amateur photographer is as much the result of development, as a successful person in any branch of knowledge, and this development has its natural stages.

At the first, the novelty of the process holds the attention of the beginner. He sees some one photographing and he determines to do the same. The mysterious machine is obtained and set up, with a thrill of satisfaction he uncaps the lens; he feels he is "taking a picture."

With the same intense interest he develops his first plate, which most likely has two exposures upon it. The less he knows about the process the greater his enthusiasm. He prefers at first to stumble into his results. The uncertainty of the sport has a charm for him.

With a good outfit, good plates and chemicals, the difficulties in making an ordinary photograph are few, and with care they are soon mastered.

Having passed the uncertainty and difficulty stages in his progress, the question for the amateur is, shall he work for quantity or quality?

The way this question is answered will determine the length of time that photography will have much interest for him.

The person who is satisfied with seeing what his lens will do, is not the highest type of an amateur. A few fortunate accidents are liable to fall to the lot of anyone. These are usually shown as specimens of skilful work, though they are not the result of care or skill, but effects often quite unforeseen.

For a time such work may be interesting, but the lasting qualities are lacking.

It is not denied that there is a good deal of pleasure and satisfaction in making snap shots at every conceivable kind of objects. Sport is uppermost in the minds of a large class who are not very extensively represented at the exhibitions of the best amateur work. Unless a person advances beyond this stage he soon loses his interest.

There are enough special branches pertaining to photography to suit the tastes of all. Some will find pleasure in perfecting the mechanical part. To be able to photograph a bullet shot from a gun, is in this line of work.

New processes of reproduction are yet possible. There is great satisfaction in making a nearly perfect negative, but work that is technically perfect is still incomplete. The best lenses, chemicals and subjects are necessary for the best work, which, when done, should give unmistakable evidence of individual thought and taste as well as skill. The fact that the work of one person is more pleasing and satisfactory than the work of another, suggests that he puts more thought into it. The amateur should study art principles and use them.

Intelligent use of means, may express an idea with the camera, but of course less perfectly than with the brush. Beauty of form and composition may be expressed in effects of light and shade, though the possibilities of color are still outside the range of photography. As the amateur develops in the technical and artistic knowledge of his art, he will be able to select appropriate subjects and fill in the surroundings so as to idealize them, and in this he will show his individuality.

He should have a story to tell and tell it. Pictures are not made by rule alone, there is a sense of the fitness of things that constitutes much that belongs to true art. One must go afield because he loves nature rather than in search of subjects, if he would return with pictures instead of record views. Landscape pictures are always interesting, and studies in still life afford endless opportunity for originality.

The nearer the amateur can attain to perfection in his work the greater and more lasting will be his interest. There is nothing tiresome in good work.

Perfect pictures will never become monotonous, even to the most successful.

LOOKING AHEAD.

By Dr. John Nicol, Editor of Photographic Beacon.

Professional photographers are proverbially conservative, going slowly in all things but development, and especially averse to change in their methods of working. Even changes that, prima facia are likely to be greatly for their good, require to be iterated and reiterated, and pressed on their attention again and again before they can be induced to adopt them, or even give them a trial.

As I have long believed the time will come when the photographer's duties will end with the production of the negative which will be handed over to the sitter; and that prints by a mechanical method will be supplied to his order, and that such a change will be beneficial to all concerned. I string together the following prospective dialogue, believing that something like it will be a matter of daily occurrence in A. D., 1990.

The scene may be laid in an elegantly furnished house in one of the fashionable but quiet streets of the city; as the photographer will be recognized as a true artist, his fees will be in proportion to his position and reputation. The studio is simply an ordinary room luxuriously furnished, differing only from similar rooms in similar houses, in having a series of backgrounds against one of the walls, and round the other three, rows upon rows of electric lights, controlled singly and in groups, by press buttons, or levers in the vicinity of the camera.

The artist, in his dress and appearance in keeping with his surroundings, is looking over his bank book with a pleasant smile on his face that plainly indicates a good balance on the right side, when a gentleman is ushered into the room.

Good morning Mr. Luminrite, the home circle has decided that I must be photographed, and having seen the criticism on your recent work in the *Solar Register*, decided to ask you to make the negative. A picture something in the style of that of the late Secretary of the Exchange, or the President of the Bon Accord Club would be satisfactory, but of course that must be left to you.

Oh! of course, of course, the selection of the pose, and composition of the picture generally, must depend on the lines of your own figure, and your own idiosyncrasy generally, and that I shall discover through a little social intercourse. When will it be convenient for you to give me two or three hours for the sitting?

Well, I have really little time to spare. To-day I am at liberty for two or three hours, and I could spare an hour or two on

Thursday.

That will do very well. I have a sitter at noon, it is now 10.30, let us have a comfortable chat till her arrival. During that time I shall have studied you sufficiently to be able to decide as to the treatment that will suit you best, and then if you can come on Thursday at, say, ten o'clock, I think I may promise to let you off within an hour.

That will suit me to a T, and may I ask what the fee will he?

The fact is, there is no recognized standard. Fees depend altogether on the reputation of the artist. I made just as good negatives a few years ago, when I was content to get two or three dollars. Now the public are pleased to rate me higher, and I generally get ten dollars for each negative; and probably by and by, if the critics continue as favorable, my price may go up to twenty dollars.

That will be quite satisfactory, and now, as we have at least an hour to talk, perhaps you could tell me something about how photographers managed in the long, long ago. I recently came upon a pile of old photographic journals, and was amazed to see the round about way, in which they seem to have carried on their trade.

That is it! you've hit the right word; it was a trade, and by all accounts, most of them found it a miserable one. They employed only daylight with all its uncertainties; bothered with an unmanageable quantity of it to-day, and could do nothing in consequence of its absence to-morrow. Their studios were huge glass houses like conservatories, and light and shade had to be managed as best they could by screens. Then they produced the prints, as well as the negatives; not permanent prints, such as you will obtain from any of the printers whom you may employ, but on silvered paper, which were tedious to get in dull weather; often uncertain from various causes, and always requiring a staff of assistants who had to be paid, whether work could be done or not, while the superintendence of the bulky establishment so distracted the attention of the principal, that even if he was an

artist, which he rarely was, he found it hardly possible to put his heart into his work, or infuse into it his own individuality.

Now, as you no doubt are aware, all this is changed. After having decided on the nature of the composition best suited to you, I pull a cord and a suitable background comes into position, arrange the required accessories, and seat you in the chair. Each of those levers, brings into play, one or a group of the electric lights that occupy three sides of the room, so that I can with ease and certainty get any effect that I desire. For development, a monochromatically lighted room is still a necessity, but there are no solutions to mess with, and by their vagaries perplex the artist. The plate is merely put into a suitable frame, and by pressure on one or other of various buttons, the various kinds of electricity, and in the required quantities, are made to play on the surface, producing the image in all its bloom and beauty. One of Hygromaker's plates is then placed in a printing frame, covered by the negative, and exposed to the light of that 2,000 arc lamp for an instant, and then breathed on and brushed over with an enamel powder, by the greater or less application of which I may modify the relation between the lights and shades at will. The plate is then placed in a muffle, and a current of electricity turned on till the temperature is sufficiently high to fuse the enamel powder. When it has become cold, I have the pleasure of handing to my client a vitrified negative, as indestructible as the glass itself. This he may take to anyone of the various process printers, according as his taste or purpose may suggest, who will supply prints by the dozen, at a tithe of the cost of the silver prints of the olden time, and as permanent as the paper on which they are printed.

Thank you, you have given me a most lucid description of the art of photography as now practiced, and as that carriage just arrived, must have brought your expected sitter, I shall say good bye, and will be here promptly at ten o'clock on Thursday.

"LOOKING BACKWARD."

By Nathaniel Roberts, C. E., Washington, D. C.

My first experience with photography was in the Spring of 1868. When Mr. Talbot, of "Talbot-type" fame gave, an interesting address on the history of photography to the senior class in the school of which I was a pupil,

His description of the various processes from Daguerre down to the then present time, was so interesting that I purchased a small printing frame, some sensitive paper, and some scratched negatives from a local photographer and under the advice of Mr. Talbot who had kindly invited me to visit-him, I acquired a fair degree of skill in the printing and toning of silver prints.

My next experience was in the making of negatives. I became the happy possessor of a second hand lens, a new 6½" x 8½" camera made by "Fallowfield" and a tripod; not one of the compact, folding and telescopic tripods of the present day, but a rigid tripod with a ball and socket joint that would never work the way it was intended to.

With this apparatus I took negatives of everything in the neighborhood of my father's house, and for quite a distance around, but my ambition was not satisfied until I bought a second hand portable tent of the "Rouch" pattern, constucted to shut up as a box and contain a water tank, silver bath, bottles of collodion, developer, and cyanide solution, and a supply of glass plates.

Equipped with this tent and its tripod, my camera and its tripod, and two single backs, I would spend my Saturday afternoons and holidays in quest of subjects far and near. If my old camera could tell of the weary tramps, aching back and tired arms, as I toiled along under the weight of my cumbersome apparatus by the banks of the lovely "Avon," from Bath to Holt and Whaddon Church, or at the ruins of Farleigh Castle, at Longleet House, Crockerton Pond, Locock Abbey, (the residence of Mr. Talbot) Bowood House, taking views of all that seemed to me to be harmonious.

After that I used the Collodion Emulsion and prepared my own dry plates, also dry plates from "Kennett's pelicle," but not so rapid as the dry plates of to-day, and equipped with a changing box, would leave my tent at home, thus gradually approaching nearer to the present method of working.

But now with the apparatus reduced to apparently the smallest weight, and occupying so much less space, with plates that are as rapid as can be desired, and developers that give us such good results without staining the hands. Photography is a pleasant pastime, compared with what it used to be, and when some enterprising photographer shall discover a printing process that shall equal the chloride of silver in appearance, and require no toning, it will be better still.

"HOW SHALL WE BUILD OUR TEMPLE OF LIGHT." Geo. G. Roekwood, N. Y.

One of the penalties or privileges of an active photographer in New York, is a lively correspondence with fellow craftsmen in provincial cities, who desire information on many practical questions omitted in the technical books. I will do myself the justice to say that so far as possible, I have tried faithfully to give such information as a thoroughly practical experience affords, and speak "The truth the whole truth and nothing but the truth" to all comers. One party recently addressed me and considerately sent a stenographer to get my views on, "the construction of a photographic establishment."

While the suggestions contained herein are not all novel, possibly some matters may be worth considering by those contemplating a new, or reconstruction of an old establishment. Being invited by the publishers of this volume to discuss the above question I gladly adopt the "interview" given as follows and submit the questions of my correspondent and answers:

First.—Please give suggestions as to color of paper, frieze, and dado, for rooms to be used as an artistic photograph gallery. Also give suggestions as to draperies, portières, furniture, etc., including arrangement of bric-a-brac, color of carpets, rugs, etc.

Second.—The phrases "Art Gallery," "Studio," etc., being worn threadbare, please suggest something else to be used as a sign, painted outside of building. Also some Latin phrase suitable for scroll on card mounts.

Third.—Color of carpet in skylight.

"The operating room," should have a paper of a neutral gray tint, what is called French gray, for the reasons that it does not absorb all the light as black does, and does not reflect too much; this is my experience of thirty-five years. I have found cartridge paper of this neutral tint, an excellent thing in the skylight room. No white must be allowed there, as it gives additional high lights in the eyes and causes other complications. I have been in galleries when old photographers could not tell what was the matter with the pictures, whose faults were due to the presence of white objects, screens, and reflectors in the room. The skylight itself should be due north, with the upper half at an angle of 45 degrees, and not less than 16 feet long; the lower end of the sash should come as near to the floor as possible, for use in

case of emergency. The skylight should be in the middle of the side wall so that pictures may be made from either end. The top must be covered with two sets of screens on spring rollers, one opaque, and one of white linen, both rolling to the top; the side curtain must be absolutely opaque, with spring rollers. The posing chair should be a low-backed chair fastened to a platform, two feet by three, which should be on castors. This enables the operator to move the sitter to any position, without the trouble of getting up. In my establishment the head rest is attached to the back of the posing chair, so that it all moves together. There should be a portable head screen, made of light gauze, to intercept the direct rays of light and diffuse them softly over the face. If practicable the skylight room should be not less than sixty feet long, in which case the skylight itself might be within ten or twelve feet from the west end of the side wall and away from the reception room. The developing room should be at the west end of the skylight and behind the screen, so that the confusion and dirt will be out of sight. The dressing room, if not down stairs, is better at the east end of the skylight, although these localities are not essential. The majority of pictures are made with the camera at the east end of the room, it being my experience that the left side of the face, in a majority of sitters, is the most natural and characteristic. The reception room should be entirely free from plaster busts, and antique specimens of any kind, as everything white and glaring is detrimental to the pictures there exhibited. Fine paintings, of course, add. The walls of the reception room should be of darker tint, and I have found cartridge paper the finest of backgrounds for the exhibition of pictures. The carpet should be without geometrical figure. Observe this fact especially in choosing a carpet for the skylight room. For every dollar spent in elegant, quiet furniture, twenty-five comes in, in the course of the year. My reception room has a carpet made with border like an immense rug, which strikes you, the moment you enter the room, with a sense of restfulness. The whole effect is a sort of mossy gray green. Long sofas line the walls. They are covered with dark material. A few elegant chairs should be disposed here and there. Everything should be quiet and subordinate in tone. Let the dressing room be as tasteful and rich, as means will allow, with a full length mirror, and an adjustable small mirror, so arranged that the sitters can, at once, see themselves front

and back. Avoid anything glaring, as it interferes with rich costumes. Gentlemen appreciate, no less than ladies, elegant comforts, and their dressing room should be equally handsome, and, of course, separate. The office should be so situated that visitors, in going to and from the operating room, should pass the cashier or office. This gives control of the business, and, at the same time, enables the manager, clerk, or proprietor, to salute the customer. The proprietor or photographer should refresh his eye and mind, by frequent studies of the best works of art in painting and drawing, and if practicable an occasional visit to the art centres of the world.

The first photograph galleries in New York simply have the name of artist with the word "Portraits" handsomely lettered on a gilt sign. Look through the Latin phrases in Webster's Unabridged, to see if you cannot find an appropriate motto for scroll. You might use Semper paratus, always ready.

Fifth.—Carpet in skylight should be subdued in tone, and geometric patterns should be avoided.

"HAVE THE PUBLIC ANY RIGHTS WHICH THE PHOTOGRAPHER SHOULD RESPECT?"

By George G. Roekwood, New York.

It is said that a famous railway president, now resting from his labors, was once discussing some proposed changes in the administration of the many roads under his control, when a fellow director enquired the probable effect on the traveling public. "The public be damned," was the wrathful response of the executive officer. "How will it effect the finances?" I fear that the story is not only a fact, but also true in spirit or sentiment, of many people who devote themselves to the art of making faces. The question is not always what will best please the public, enhance the reputation of the photographer, or advance the art. Frequently the feeling is to get the money and do as little in return as possible. On a recent visit to a neighboring city, a member of the craft greeted me with an unending series of complaints as to the unreasonableness of the public, how they would insist on certain notions, wanted repeated sittings, and sharply criticised the work of this photo-Raphaelesque artist. In fact it was plain that his customers wickedly exacted careful attention,

skilful work and artistic results, none of which this man seemed capable of affording or bestowing. My enquiries as to whether he was always in the right and the public always in the wrong, did not meet with encouragement. Now this party represents quite a class of photographers who seem to believe that the public have no rights that the photographer is bound to respect. I have been in active business thirty-four years and have never regretted my selection of this art science as an occupation. While it is true that ours is not exempt from the usual disappointments, losses and aggravations of all business life, I know of no calling which has such rewards and compensations. as photography. There is no one thing of equal cost, that affords such pleasure to the purchaser as a good photograph, and the public, as a class, are excellent judges, for in nothing are they more interested than in the portraits of the members of their family. The making of a picture is primarily a purely commercial transaction between the sitter and the-shall I say artist. Very often in many galleries it is the inexorable rule that the patron pays in advance. Now, he or she is entitled to not only fair and generous treatment, but a right to express their likes and dislikes and exact, it may be, a good and satisfactory likeness for their money, with as much art in the posing and lighting as the photographer is capable of imparting. And where intention is apparent that this is being sought by the operator, the sitter, as a general thing, is neither exacting nor captious. Now, my experience is, that the public is a pretty good fellow and responds good naturedly and thankfully to an earnest endeavor to please him and pays more cheerfully for a good picture than for anything else. He or she may quibble about prices in the preliminary negotiations, but if the result is worthy of the art, they are grateful for it and often show it by an increase of the orders.

Therefore, I say that primarily our art should be practised on purely business principles, with a due regard to meum and tuum and in no wise different from the laudable and honest methods of other occupations. While I have the greatest love for the art and look to great usefulness and results in the future, I have no idea that it will reach that exalted plane on which its votaries can claim exemption from common sense methods, through the idiosyncrasies of genius,

THE MOST REFRACTIVE RAYS AND THEIR PHOTO-GRAPHIC PICTURE.

By V. Schumann, Leipzig.

The most refractive rays, so far as known to us, issue from the electric spark. Of these ranks first the aluminium spark. It gives in the most extreme ultra violet several lines, which, undoubtedly, are the most refractive that have ever been observed. Cornu has taken a photographic view of these lines and has determined also their wave length. The most diverted one has the wave length 1,852.

The observation of this spectrum district, no matter whether it is executed with the ocular or by means of the photographic plate, demands an apparatus which will admit the passage of rays of such small wave length as above. Glass prisms and lenses are not suitable for this purpose, because they absorb the largest part of all the ultra violet light. More adaptable to this purpose is calc spar, but quartz only is actually fit for use, which, aside from the scarce fluorite, must be recommended above all other means for the investigation of the most refractive ultra violet light. Fluorite or fluor spar is distinguished from the quartz by its greater power of admitting the passage of light, but its extreme scarcity, particularly if colorless and without cleavage, excludes its application for spectrum purposes almost completely.

The refractive spectrum might now be entirely dispensed with and recourse be had to the reflection spectrum, where only reflected light is used as soon as a catoptric spectrum apparatus is employed. The wonderful accomplishments of a concave grating would doubtless place the prism in the shade, if another circumstance did not exclude its application completely, where the investigation of the most refractive rays come into consideration. The latter are, strange to say, absorbed by atmospheric air to a surprising degree. If the light ray has now to pass through too dense a portion of air before it reaches the photographic plate or the fluorescent body, it will either not get through the apparatus at all or its energy is so weakened that a perceptible picture cannot any longer be produced. To conceal light rays of the wave length 1,852. a length of a few meters of air is alone sufficient. Even two meters of air are capable of reducing the photographic action so far that it can be made visible only by observing certain precautionary rules. But the Rowland grating requires, if the whole apparatus is not in vacuo, that the rays pass through an atmospheric column of several meters. Here the attempt would be useless to photograph the last lines of aluminium.

Professor Rowland, at the particular request of Mr. J. A. Brashiar, of Allegheny, had a concave grating divided for me, which at a width of two inches and 14,400 lines to the inch, has a radius of only 1,060 m. m. This grating possesses an enormous brilliancy, and with it I have, for instance, been able to photograph the most refractive lines of zinc in only a few minutes. But I have never succeeded in taking one of the still stronger diverted lines, those belonging to aluminium. All attempts to this effect remained without success. But if a picture cannot be obtained with an apparatus of such a short focal width and of such extraordinary brilliancy, of this spectrum district, then the larger Rowland gratings of concave construction will be still less applicable for this purpose.

To the photography of the most refractive ultra violet a spectrum apparatus of short focal length is the most suitable, and the prism, on account of its greater brilliancy, is decidedly to be preferred to the grating as an analyzer.

With my spectrograph of 750 m. m. focus I have been able to work only with very modest success. My quartz apparatus of about 300 m. m. focal length did not prove much better. But excellent results were accomplished by an instrument whose tubes for the yellow rays of the line D, possessed a length of only 160 m. m.

With this latter instrument whose optical parts consisted also of quartz, I came in the ultra violet to the wave length 1,820, therefore considerably beyond the most refractive aluminium line. Of the largest part of some twenty elements whose spark light I examined, I could photograph the spectrum up to this boundary. The number of the new lines discovered in this district was thereby unexpectedly large. To those elements excelling, by richness of lines, belongs, as is generally known, iron. Its spectrum till now, was known to the wave length of 2,167 (Liveing and Dewer). I have succeeded in tracing the same to wave length 1,830, and have obtained photographic views of the newly discovered part, which, as far as their number of lines is concerned, might hardly be inferior to the well known iron spectrum. The lines of wolfram appear still denser than those

of iron. Thallium excels by extremely marked line groups; likewise cadmium. Both display on both sides of the aluminium line 1,852, a relatively high energy.

But not only solid bodies act photographically in this part of the spectrum. The gases seem to show a similar disposition as soon as care is taken, that they are brought to incandescence in a suitable manner. Thus I have been able to take the spectrum of hydrocarbons likewise to the underlating length 1,830, by means of the Geissler tubes constructed by me for this purpose, and it is to be expected that the other gases will also show an analogous condition.

It is remarkable that I never have succeeded in photographing the spectrum beyond 1,820, no matter whether I exposed twice, three or four times as long as considered necessary to reach this boundary. According to this it should be accepted that an effective light does not exist beyond 1,820. But if we reflect that by application of a spectrum apparatus with longer tubes, with which in consequence of the absorption of air the effective boundary moves considerably towards the red end of the spectrum, one would conclude by analogy that we have to acknowledge that photographically, effective rays must also be present beyond 1,820, and the reason why they have not been made visible with the means heretofore applied, should be looked for more in the insufficiency of means than in the energy of the rays.

As long as I brought only the quartz into service, I was of the opinion that its incapacity for the passage of the most refractive light was the cause that the effective boundary could not be pushed beyond 1,820. But after I convinced myself by views taken by means of a prism and two lenses of fluorite, that notwithstanding the greater capacity, lines more refractive than those of 1,820 could not be photographed, I examined the sensitive film of the gelatine bromide plate with regard to its condition in the extreme ultra violet.

My experiments in this case could extend only to the transparency power of the thin emulsion film of the photographic plate, previous observations having distinctly shown, that in no way a photographic action of more refractive rays beyond 1,820 could be proven. It is known that a developable picture on and in the bromide of silver coating will be obtained only when the rays are absorbed by it. Light which penetrates the light sensitive film unobstructed will never exercise any photographic





effect. But it is not sufficient that the rays are kept back by the film; they have also to decompose the bromide of silver particles so much if a picture is to be obtained) that these decompose in the subsequent treatment with the developer and remain behind in the gelatine film as dark colored silver. From the absorption of the light rays of a sensitive plate, we by no means can draw the conclusion that the same is also active for the rays kept back. The latter may produce heat as well as fluorescence and in this case they will not exercise a photochemical effect.

The proceeding in the light sensitive film is more complicated if a simultaneous thermic and chemical change of the ray energy takes place. And this is the case, according to my observations, if a gelatine plate is exposed to the most refractive light. If the stripped film of a bromide of silver plate is brought between the slit of a spectrograph, whose optical parts consist of quartz, and the light source, it will be found that it has the most penetrating capacity for those rays, which exercise the greatest photographic action. If the light source is an electric spark, the light which passed, notwithstanding its richness of strongly diverted rays, will hardly reach to cadmium line No. 23, wave length 2,322. A longer duration of exposure and increase of spark energy has hardly any influence upon the increased length of the spectrum pictures. The film held in front of the slit is absolutely impenetrable for rays which extend beyond 2,322.

This behavior of the films seems to be a contradiction to the law of the conservation of energy, because the plate is most sensitive for rays whose passage it admits mostly. The spectrum view which is obtained with the gelatine film in the slit proves this apparently. But to be able to fully comprehend the behavior of the latter, it must be considered that the same is composed only of the light sensitive substance, the AgBr. (respectively AgBr. and AgI.) and of the connecting medium of the silver particles, the gelatine. I have brought now both, separated from each other, in the ray passage of my spectrograph, and have found out, photographically, which rays are admitted to pass and which are absorbed completely. Thereby it has been shown that the gelatine absorbs the most refractive rays most energetically, even as a very thin film. At a thickness of only 0.020 m. m. I was hardly able with such a film to photograph the spectrum of the electric spark to the cadmium line No. 23, wave length No. 2,314. If the thickness of the gela-

tine was reduced, my views extended towards the refractive end of the spectrum, but so modestly that even with a gelatine film of 0.00004 m.m. the resistance could undoubtedly still be proven which opposes the rays of aluminium of the wave length 1.852. But if such an extremely thin film as the above mentioned absorbs the light rays considerably, then they will not be able to penetrate into the depth of the coating of the photographic plate. They will lose their whole energy before they have decomposed the required quantity of bromide of silver necessary for the production of a developable picture. Whether the time of exposure is increased or not does not benefit the growth of the spectrum, because the increased light energy will suffocate just as well in the upper part of the film as under the action of a shorter exposure. Although the gelatine film of a bromide of silver plate on an average may not exceed a thickness of 0.02 to 0.03m. m., it is still of such an importance, in comparison to the above mentioned film of my absorption experiments, that I feel justified to consider the opacity of the gelatine as a main obstruction in photographing probably existing rays, which are more refractive than rays of 1,820 wave length.

In the same manner as the gelatine I inserted a layer of bromide of silver in the ray passage of my spectrograph. Thus a less partial absorption took place than with the gelatine filter. But it can be recognized on all plates, that the bromide of silver filter shows less opacity for the most refractive rays and the neighboring district of the ultra violet. Although this difference is not very perceptible, and, in consideration of the many defects which my bromide of silver filters have shown, a particular value can hardly be ascribed to the views obtained thereby, they are still not entirely worthless, because they explain the reason of the action boundary at 1,820, which should not be disregarded. The greater transparency of the bromide of silver for rays of this district points to a reduced sensitiveness which it shows for the same.

The manner in which I discovered the light absorption of the gelatine and the bromide of silver is not entirely free from objection. The plates which I used contained—as bromide of silver dry plates—both gelatine and bromide of silver, and my results have therefor only a relative value. The transparency of the gelatine films is therefore in reality much greater than resulted from my views, because the picture producing light rays

had not only etched through the gelatine absorptive film, but had also penetrated to the gelatine coating nearest the plate.

A governing result I could have obtained only with a plate containing neither gelatine nor bromide of silver, and still of sufficient light sensitiveness. Unfortunately, such a plate does not exist. Collodion, which might come into question, absorbed, as learned by my tests, the most refractive rays much stronger than gelatine. The collodion plate on account of its nonsensitiveness would not have been able to replace the gelatine even approximately.

There is no hope, according to my experiments, to remove the spectrum boundary line once more, and beyond wave length 1.820.

The photographic view of the most refractive ultra violet is rendered extremely difficult by the diffused light appearing in the interior of the spectrograph. At short exposure, this is not felt, but most certainly at longer duration. It will then fog the whole plate, and this fog does cover the spectrum end quite often to such a degree, that it disappears completely. If there was a suitable absorbent for the less diverted ultra violet rays, but which would admit the passage to the more refractive rays to be photographed, a much better view could be obtained with the aid of such a filter than is possible under the existing circumstances. Unfortunately, there is no such filter known yet.

In all my views of the ultra violet, in consequence of the absence of such a filter, I have only been enabled to reduce the action of the diffused light, but not to exclude it entirely, and I have succeeded in this by shortening the slitlength of the spectrograph.

The smaller the slit, the less light will reach the interior part of the spectrograph, and so much less light can also be dispersed in the prism as well as in the lenses. The reduction of the slit opening should take place only on the length of the slit. To make the slit width suitable for the before mentioned purpose, is not admissible because the dissolution of the line groups of the spectrum and otherwise also the time of exposure depends upon the same. My slit length was seldom more than one millimetre, but many times I have been obliged to reduce the same to the tenth part of that size. If I had opened the slit in its full length extension to the light source, all lines of weaker actions would have furnished then very unclear pictures.

EXPRESSION IN LANDSCAPE PHOTOGRAPHY.

By S. R. Stoddard, Glens Falls, N. Y.

Does some wise person smile a superior smile at the suggestion of "expression" in connection with landscape photography? It is not so very long, however, since the belief was common that a photographic portrait (being a mere mechanical affair) could never give more than a sort of architectural plan of a face, and even then would for some unexplained reason, show unnatural lights and shadows, false perspective, etc., etc.; and quite intelligent votaries of this humble handmaiden of art, meekly bowed to the belief and waited, lowly at the feet of some arrogant disciple of the immortal old masters, who plumed himself on having the divine gift of portraying "expression," when in truth he couldn't draw two noses alike to save his life. So it became accepted for a fact that no machine could transcribe that flitting, intangible something, which friends recognized as the real portrait, and which the artist of the brush, alone could catch and give, regardless of faults in drawing that might be quite evident to the common observer.

This early condition is now passed, and the artist has found in the camera a more perfect instrument than the clumsy pencil. Under its uncompromising eye he has learned to draw with a care that was thought entirely unnecessary of old, and sometimes has lessened reverence for ancient art, to such an extent that it is doubtful if any of the "old masters" could get their venerated specimens "on the line" in any modern exhibition, even if they succeeded in snuggling them in at all. If this be rank heresy, blame the hanging committee, not me, for stating the fact.

There was, perhaps, good reason to find fault with the crude first attempts at machine portraiture. The trouble was not, however, in the machine, but in the fact that the primitive operator, was himself only a machine worker, and not a very good mechanic at that. When the artist became operator, he produced pictures by aid of the superior instrument that are as nearly above criticism as it is possible for human work to be, and the artist of the brush is very glad to prove his own work by the new standard of perfection.

In landscape photography as well, we have in place of chalky skies and unmeaning blanks where there should be water, clouds of pearly white or the dusky shroud that masks the thunderstorm, and quiet depths or sunlit waves glinting with their myriad reflections, where the painter comes to study and correct his errors of painted sky and water of earlier times.

By "expression," I do not mean simply choice of subject with the sun in any particular quarter as determined by any fixed rule. It is something for which no rule can be given. It is the feeling that leads the true artist to grasp some particular condition of atmosphere that shall subordinate the unpleasant and bring into prominence the beautiful of the subject. Distinctness of outline is desirable, and the direction of light must be considered in view of its power to emphasize or modify particular features, but the quality of the light gives to it the expression that shall make it pleasant or unpleasant to look upon.

You have waited long, perhaps, for a suitable atmosphere through which to get distant islands on the ocean's rim, or, maybe, mountains that are far away, until some morning every rift and scar or distant island comes out sharp and clear. Everything is favorable to the enterprise. And when the picture is developed, the mountains show with every line dark and clear, but somehow there is no satisfaction in the fact, for the distance and the middle ground seem all on one plane, and the foreground is thin and weak, with no life anywhere on the whole disappointing plate. There is no more atmosphere in it than in a Japanese painting, or in the airless landscapes of the moon. Don't blame the instrument. It cannot tell a lie. You got the expression of the day; it was your fault in selecting the time.

The day itself may not be unpleasant to the observer. It is clear, sharp and cold and with a steely sparkle that is altogether attractive as viewed in the bracing spirit it inspires, but the resulting picture does not give this light and sparkle; it is cold and clear possibly, but thin, lifeless and unsatisfactory to look upon. It is a face young, perhaps, but a face from which all hope is fled.

Another day you look upon the same view under other conditions. The sun is in the same quarter and seems to shine not one whit brighter than before, but the landscape is luminous with a soft radiance that fills the air and sets the mountains all atremble. The resulting picture is full of rounded detail that seems almost to stand out from the surface, to go back into wonderful depths and away into space immeasurable. It is the same

face as before, but now sparkling with life and soul and is full of youth and happiness. The instrument makes no mistake. You have now caught the expression of a happy day.

Again, near the close of a summer's day, the sun casts long shadows from tree and hill, and the slope of the mountains, the trunks of the trees, the rocks and fences toward the west, are picked out in strong lines of light, and great masses of luminous shadow, form the greater portion of the picture. It is beautiful to the eye, but it is a delusion and a snare, for the yellow sunlight that gilds the edge of every object, affects the sensitive plate but little more than do the purple shadows, and the unfeeling instrument yields but a flat picture at the best. It is no fault of the instrument that the picture is a failure. Your eve. that has expanded as the light faded, did not tell you that darkness was so near and that the pencils of gold were almost shad-To attempt to catch such colors by photography, is a case of love's labor lost. It may be reached in time, but, until the time does come, we must be satisfied to get this sunset effect early in the blue morning, even as we make our loveliest "moonlight" views toward the rising or the setting sun.

Can the extremes of these two conditions be overcome?

To a certain extent they can, else this article were of no value. In a judicious use of the diaphragm, will be found an unexpected and patent source of relief. Long exposure and short exposure, restrained or accelerated development, each have their uses; but distinct from these and productive of results which they can never command, is the proper handling of the diaphragm.

In rare cases the atmosphere is too luminous. Its full extent is perhaps not realized unless special thought is given it, for the eye has accommodated itself to the condition by diaphragming itself down very small. Apply the lesson. Do not regulate the exposure by simply shortening the time, but rather give full time with a very small diaphragm. Carried to an extreme, it is possible to get something of the effect of the thin atmosphere so unsatisfactory at times. Do not on the contrary make the mistake of using a small opening when the air is thin and the trees seem but patches against the hills beyond. Better not waste a plate on it at all, but if you must do so, give it a generous opening and gather in all the half defined rays that will enter, even at the risk of losing that sharpness of detail that some consider so essential in a photograph. You will sometimes get a breadth

and strength that will surprise you and go far toward atoning for want of detail.

One other thought is suggested in regard to this sharpness of detail. It may vary according to the size of the picture. In one that can be taken readily in the hand, or that will be looked at through the magnifying glass, if sharp and clean and free from anything like a blurred line, although the contrast may be little and the transition from light to dark too gradual to be striking, the fault will not be so marked, but a large picture should be bold and strong of light and shadow. It may be taken, and should be taken, with a large opening. The loss of detail is often an absolute advantage, for the flecks and patches of undefined light and the great area of shadow, give a breadth and strength to it that cannot be attained if the opening through which it is taken is too small.

HASH.

By Wm. J. Tapley, Canada.

I came across the following in a work by Story. "We have not a natural artistic sense, as had the ancient Greeks. Nature is undressed before us always, and therefore there is more real feeling and knowledge about landscape than about the human figure, and a better understanding of pictures than of statues." "The worst of it is, that our taste becomes corrupted and our sensibility to beauty impaired."

"Art should be worshipped as a divinity, pursued purely from love, followed from enthusiasm, wooed with one's whole heart. desired as an end, not as a means. It demands all one's soul and heart and intellect—ay and even that is too little."

"Nature gives us what we seek, and reflects back to us what we are. Everything depends on the spirit with which we approach it; we can only find what we bring; the key to all secrets we must carry in ourselves."

I think these sentences appropriate for our art, and it is truly an art, to those of us who are artists.

Beauty in the abstract, is a delight and he who looks for it mevery sitter will not be disappointed. Favors have been more evenly distributed than we at first imagine, and the sitter may not have a handsome face, but has a striking figure, a beautiful hand, a lovely ear, or that indefinite something that we call grace.

True we may not be able to photograph certain phases of grace, but the delight that ensues from the discovery of it in a sitter, will kindle enthusiasm and lead to better results. A soft soulful voice has often done more to help me to success, than a Grecian profile, while that something that we call magnetism has been the ground work of many a happy portrait. I think the average photographer does not cultivate a study of his sitter, he tries to polish them off as quickly as possible.

So many people on looking at a portrait say: "So and so never looked like that." "Why, he is lame and crooked." "She has a broad expressionless face, and these show beautiful faces." Our only answer is: That is the way we see these people, the image of the divine is not lost, though we sometimes have to seek for sometraces of it.

It is an old saying, that the photo reflects the temper of the operator, therefore let him do his swearing in the dark room and when annoyed, let him become killingly polite, but never appear to be "out."

The artistic spirit is the only hope of the old photographer who is crowded by the numerous claimants to patronage brought in by the dry plate boom.

I recently read a labored article in which the writer tried to prove that the only way to end the cut-throat business of to-day, was by having every photographer make his own dry plates; that by breaking up the dry plate factories, the noted difficulties would come back again and the cheap John could not work, because he would be obliged to know something. Such a thought is childish. The wheels of progress are so geared that they turn only one way; dry plates have come to stay.

If I can see beauty in the human face, and can reproduce it, I can command at least three times the reward for my work that he can who simply shoots a plate at his patron. True, in a small city, such a course limits trade, but one-half of the business with three times the prices is much better for mind and body and pocket too.

Recently I suggested to a resident of a neighboring city where cutting of prices is carried on to a shameful extent, that he or some other disinterested person, ought to go around and have an agreement signed, binding such photographers to a minimum price, say three dollars per dozen; he who wished to do so could charge just as much more as he thought his work to be worth. I think this a manly and most reasonable way to meet ruinous prices.

The question is often asked, where do all the pins go to that are sold during even one year?

I often wonder where all the detective and other hand cameras, toys and otherwise, will go to by and by. Amateurism breaks out sometimes mildly and often runs a full course. More frequently the patient finds he has to do a little thinking, to be able to press the button even if "we do the rest."

I have the greatest respect for amateurs and help them all I can. I often learn from them for they often rush where "Angels fear to tread," and get there all the same.

It is hard for an old timer to realize the possibilities of dry plates.

I have recently tried an old dodge on a certain kind of sitter whose peculiarity will be recognized—that is to use a looking glass in such a position that he can see the reflection while exposure is made and thus assume all responsibility regarding expression.

If the camera is pointed so as to take the reflection instead of the sitter, it relieves the strain on some persons of a nervous temperament and although the resulting negative has a reversed image like a tintype, it sometimes does not make much difference.

INCONGRUITIES IN PHOTOGRAPHIC PORTRAITURE.

By J. Traill Taylor, Editor, British Journal of Photography.

There are some incongruities in photographic portraiture which, not alone to a cultured or educated artist but to an observer capable of exercising the rare gift of common sense, mark the taker of such portraits as lacking in art education, and this no matter how well lighted, how well posed and, in short, how perfect in technique the portraits may be in themselves.

The recent examination of a collection of portraits in the Crystal Palace Exhibition, in a number of which, a very marked incongruity exists between the backgrounds and the figure, suggests this as a theme for a few words. The incongruity to which I allude, is having two kinds of linear perspective in one photograph, one of these being totally at variance with the other. This is a thing that no proper artist would dare to perpetrate in his painting, and the sooner photographic portraitists recognize and avoid the evil, the better will be their chance of receiving recognition

as artists. What would one think of the litterateur or poet who would issue to the world his productions, perhaps otherwise excellent and unexceptionable, couched in language which set at defiance all the most elementary rules of grammar?

The eye is always on a level with the horizon, and this is also true with the lens of the camera or point of observation. When two men of equal height are standing or sitting on a level, one will see the eyes of the other on the same line as that on which he sees the horizon. If therefore a portrait is to be taken with an artificial or painted background, it is incumbent that to secure "grammatical" or perspective truth the horizon line of such background must be brought opposite the lens. A well painted ground of this nature should have its horizon or "vanishing point" rather suggestive than sharp, so as not to interfere with the head or shoulders of the sitter; and in a studio, in which the camera is usually worked from a nearly equal height from the floor, the background should be painted with a special view to this.

I know of one studio where background anomalies are cleverly provided for. The backgrounds, of which there are eight or aine, are suspended in such a manner as to be capable of dropping into a well, and on a suitable one being selected, it is pulled up, and this just so far as to meet the necessary requirements. If the subject be a son of Anak and he is to be taken standing, then is the background raised until the horizon is on a level with his shoulders, more or less, the camera being elevated in a corresponding degree. In the case of a child or a group of children the opposite condition is brought into requisition.

I have just come across some notes I made ten years ago when visiting the Art Gallery of the Fair of the American Institute in which many photographs by the most eminent artists of the day were exhibited, together with paintings. Two ladies, one of whom I knew to belong to the art section of New York Society, were just leaving the large exhibit of a local photographer, when the former, pointing rather disdainfully with her fan to a large and imposing photograph, observed to the other. "After that, will you still venture to designate photographers as artists? Faugh!" Waiting till they retired, I stepped up to, and examined the productions which had evoked such hostile criticism. They were exceedingly beautiful in most respects, but displayed an utter recklessness in regard to the perspective of the backgrounds.

In a large full length portrait of a lady standing by a rustic fence the well marked horizon was below the knee of the fair subject, indicating that the camera must have been standing on or near the floor so far as regarded the truth of the background, while the perspective of the figure equally indicated that the camera must have been elevated to a level with her face when the exposure was made. This is only a type of several others in which the backgrounds were equally misplaced, the horizon in most instances falling considerably below the hips and in one example, barely above the ankle, a condition of things that could only be correct if the subject were taken when he or she had been up a ladder or perched on a rock when the exposure was made. I could advance many more examples, but *Quid plura*? The evil exists, and is a blot upon photographs and photographers, except of course those who adopt natural scenes as their backgrounds.

CAN PHOTOGRAPHS LIE?

By Henry L. Tolman, Chicago.

One of the time honored, and it may be added, time worn recommendations which have always been urged in favor of photography, was its George Washingtonlike inability to prevaricate or misrepresent. The same argument has also been used in the discussions on the relationship of photography to art, and it has been urged that this doglike fidelity to nature was fatal to its claim to rank as an art science. That the inability not only to inject into the picture anything not there, but even to alter the aerial or chromatic effect, was a positive disadvantage which reduced photography to the level of a machine. Is this so? Let us examine the question a little. If photography be so accurate, it will be a brilliant recommendation instead of a damning defect. It would be a matter of supreme satisfaction if there were one science, the results of whose operations as worked out by human agency, could be accepted as unerringly correct.

Beginning with the lens, we find that not only are all lenses made on a compromise basis, by the use of sections of spherical surfaces, but that further intentional errors are introduced under the euphonious title of "diffusion of focus." Advancing a step, we learn that the sensitive silver compound is not proportionately sensitive to all the colors of the spectrum.

Still another step, and we discover that the use of different developers may change almost entirely, the character of the image, heightening or destroying contrasts, making a bright summer scene look like a snow effect. Progressing still further, it is seen that even greater modifications can be effected in the printing and toning processes. Scientifically speaking then, no photograph can be entirely correct even as a monochrome. But even in a larger and more liberal sense, it is the exception rather than the rule, when a picture is made a faithful accurate representation of what it purports to be. Portrait photographers especially, having before them a standard of falsity to which they must conform, are compelled to use such lenses and processes as will enable them to reach that standard.

I do not wish by any means to be understood as waging warfare on what is known as artistic photography. Delicacy of perception, good taste and unbounded opportunity, will enable anyone to select out of the waste of riches of natural scenery in our own beautiful land, scenes which combine all the attractions to be found in the composition of the greatest painter. When those items of interest are united in such a way as to conform to the canons of artistic criticism, the result is called a work of art. It may or may not be an accurate photograph, according to whether the operator faithfully reproduced the light and shade and relative sharpness or indistinctness and perspective of the original, yet the departure made for the purpose of heightening the artistic effect, would be not only allowable but com-But there are many branches in photography in which this modification of the object is not permissible, and in which the most accurate reproduction only should be aimed at. Especially should this be the case in reproduction of historic scenes, of scientific machines, of works of art, of houses, scenes, autographs or letters, used in the trial of law suits. Probably any photographer would feel insulted were he to be asked if he could produce an accurate photograph of a letter, and yet I must say I have never seen a portrait photographer who did make one. Repeatedly I have been obliged, when away from home, to get letters or signatures copied for use in a law suit, and the prints which I have received, shining, rich, deep toned, soft, were in a scientific sense worse than useless. Precise directions as to how to expose, develop and print, the size of stop to use, etc., have been either totally disregarded, or answered with a sarcastic

smile of superior wisdom. One artist undertook to copy some letters behind a sheet of glass. It was proved to him that, by all the rules of light, he must have a reflection from the skylight, but in vain, and when, on his handling the same mangy looking prints, I pointed out where the reflection had utterly ruined the contrast between the black ink and white paper, he blandly replied it was a little over printed. Now every minute detail in a signature has a significance. Even the raggedness on the edges of a line, help to show how a writer held his pen and the amount of pressure he used, and when this is lost in the reproduction, much of the value of the photograph is gone. If a paper is yellow with age it should be reproduced so as to preserve the same relative appearance of light and shade, but if new, with intense blacks and whites, no print with graved background and lines seeming to sink into the paper should be accepted, no matter how artistically it may be toned or mounted.

These and other errors may be excused once, on the ground of ignorance, but what shall be said of one who deliberately uses his skill to produce false results. In a recent case involving hundreds of thousands of dollars, a clever photographer, one who had had ample experience in just such matters, by skilful manipulation of the negatives, and enlargement to order, was enabled to make some photographs so manifestly untruthful that the judge in the case, after comparing them with others, made with more regard to accuracy, was compelled to say: "If I had known as much about these pictures when I allowed them to be introduced in evidence as I do now, I should not have let them go in." He refused to allow the jury to take them into the jury room for consideration. Such a blow at the accuracy of photography is too severe to be passed unnoticed, and it will be long before it is forgotten. No photographer has a right even to follow instructions, when he knows that his work will be used for purposes of wilful deception.

This view is not at variance with those who use photography as a means of representing the beautiful. Beauty deserves a large place in our lives, the world would be desolate without it, even the weaknesses of human nature are rightly excused. But photography should with other arts have the power of representing beauty, its own crown of glory is its accuracy; fidelity to truth is its motto. Nothing should be allowed to endanger its preëminence in that way.

SOME POSSIBLE USES OF CELLULOID FILMS.

By Colonel J. Waterhouse, Asst. Surveyor-General of India.

The recent introduction of a thin, transparent film like celluloid, flexible, but tough and not easily broken, and, at the same time, unaffected by and unabsorbent of moisture, gives rise to many possibilities of its useful application in place of glass or paper in photographic and photo mechanical work.

I need not do more than mention the use of the films for making photographic transparencies for decorative and other purposes, because they already find extensive employment in this direction.

The thickness of the films in ordinary use for photographic work, appears to be too great to admit of their being used for printing from either side indiscriminately, otherwise transparencies made by contact printing on sensitive films of this material would find a useful application in the photo etching processes of heliogravure, and ordinary negatives could be used in direct carbon printing, collotype and other processes for which reversed negatives are required. Thinner films would be better.

In the transfer methods of photo lithography, it is exceedingly difficult, if not almost impossible, to ensure correctness of scale in the finished prints, whether printed on dry or damped paper; this is especially a drawback for color work, when transfers from several similar drawings have to be laid down on stone or zinc to exactly the same dimensions, in order to secure accurate register. Varnished, waxed and paraffined papers, have been tried but found to be of no advantage. Trials of celloidin films. coated with bichromate of potash and gelatine, were not satisfactory as regards the quality of the inked image, but the pieces of celloidin available, were too small to be a fair test, and the writer is awaiting some larger pieces to make further trials of. As the celloidin is absolutely unaffected by water and not extensible by ordinary pressure, there should be no stretching in transferring, and the dimensions of the original should be accurately preserved.

It is probable, however, that there might be some unequal distortion of parts of the transferred image owing, to uneven buckling of the film while passing through the press. It would also probably be necessary to apply a substratum to the film in order to give it a bite on the stone, though if the "matt" side of

the film were coated it might hold well enough. A possible difficulty would be that the impermeability of the film would prevent a sufficient loosening of the ink to make a good firm transfer on the stone. With ordinary lithographic or photo lithographic transfers, the damping after the passing through the press, plays a very important part in loosening the ink from the transfer paper, and in making it adhere to the stone or zinc plate.

Another possible application of the films would be as a support for the gelatine printing surfaces used in photo collotype printing, and this application first drew the writer's attention to celluloid some years ago. The transparency of the films would enable the hardening of the gelatine coating from the back, to be carried out exactly in the same way as with glass. thicker kinds of celluloid films which would be most suitable for collotype work, appear to have more buckle and tendency to a permanent curl than the thinner ones have, and, therefore, the even coating of the films'might present some difficulties, but Husnik's plan of drying thin plates over a curved or cylindrical surface would probably answer. It is wonderful how evenly both sides dry off. It might be necessary to roughen the outer or convex side of the films. For the same reason it may be difficult to ensure the perfect adherence of the films to a temporary metal support while printing. This could, no doubt, be overcome, and the substitution of a thin, transparent, unbreakable film for the heavy glass plates, which are so liable to destruction, would be an immense advantage.

It is found that celluloid films take a fair impression from stone or zinc, though there is some tendency to spreading of lines and the printing ink does not readily dry. This opens up a large number of useful applications for decorative purposes in connection with chromo lithography and colored transparencies.

For various purposes of making tracings, from children's transparent slates, upward, the films will, no doubt, be found useful.

Drawings in pen and ink or fine line drawings, with the brush can be made upon them, which could easily be etched on copper by the photo etching process, or reproduced by the direct blue processes. The surface is easy and pleasant to work upon with a pen, though there is a slight tendency to thickening of the lines owing to the want of absorption. Indian ink, washes off quite readily, but common ink leaves a stain. The films do not seem well adapted for drawing in wash or brush shading.

For panoramic photography, spectrum photography and other cases, in which a curved sensitive surface is a desideratum, these films should find a ready application, and the writer believes, have already done so.

Other applications will probably be found, but the above suggestions may be useful in directing attention to new uses for this beautiful and valuable material.

CALCUTTA, 1890.

NOTES ON SOME NOVELTIES OF THE YEAR.

By the English Editor.

As before, these notes are the result of a careful personal examination or study of the articles referred to. Although the INTERNATIONAL ANNUAL only appears once a year, yet it is in preparation for several months beforehand, and makers, publishers and others who desire their productions to be noticed should send them in in good time—before the end of March in each year at the very latest.

The Actinograph is the invention of Dr. Hurter and Mr. V. C. Driffield, of Mount Pleasant, Appleton, Widnes, and is an ingenious application of the slide rule for the purpose of determining photographic exposures. It provides means of reckoning for (1) Time of the Year, (2) Hour of the Day, (3) Lens, (4) Stop, and (5) Speed of Plate. The only item left to the judgment of the observer is the nature of the light at the time being, whether bright, very bright, mean, dull or very dull. The instrument is contained in a small mahogany box, which will go into the waistooat pocket. It is extremely easy to use, and from a careful trial we find that its indications are accurate and therefore very valuable. The price is 17/6; but as the exposure varies with the latitude, instruments for countries much north or south of $52\frac{1}{2}$ ° require a special scale, for which an additional 5/ is charged.

The Hibbard Repeating Flash Lamp is an American invention for which Messrs. S. Fry & Co., of 5 Chandos street, Charing Cross, London, are the English agents. It is an extremely handy lamp, by which repeated flashes of great brightness can be given, while one hand is required to manipulate the instrument. It is well made, and although small enough to fit into a case measuring $5x3\frac{1}{2}x2$ inches, it is powerful and efficient.

We have also tested Messrs. Fry's machine coated *Celluloid Pilms*, which are one-fourteenth the weight of glass. The emulsion is excellent, and the celluloid remarkably free from defects; charming prints can be obtained on their positive celluloid films, the surface being exactly like ivory.

Sun Artists is the title of a quarterly publication printed by a committee of well known amateur photographers having Mr. Arthur Boord at their head. It is published by Messsrs. Kegan, Paul & Co., the price being 5/. Each number is devoted to the illustration of the best work of some well known photographer, including No. 1, Mr. J. Gale; No. 2, Mr. H. P. Robinson, and No. 3, Mr. J. B. B. Wellington. This work is meant to show the public what photography is capable of doing in competent hands; and it is admirably fulfilling the intentions of its founders.

Messrs. Hazell, Watson & Viney, of 1 Creed Lane, Ludgate Hill, London, now rank with the largest publishers of photographic literature in the world, a result which is largely due to the energy and ability of their editor, Mr. C. W. Hastings. They publish the Amateur Photographer (weekly, 2d); the Photographic Societies' Reporter (monthly, 6d), and the Photographic Quarterly (1/6). In addition, "Special Numbers," illustrating Home Portraiture, Tours, etc., appear at regular intervals.

In addition, we note from this firm Mr. Wall's ever useful Dictionary of Photography; Mr. T. C. Hepworth's valuable book on the Lantern; Mr. Lyonel Clark's new work on Platinum Toning, etc.; a new edition of H. P. Robinson's work on "Picture Making by Photography," while several new books are announced as "in preparation."

Messrs. Marion & Co., 22 Soho Square, London, send us Samuel's camera, which is in the half-plate size, weighs under three lbs., including one double back. It has a lever focusing arrangement, and the shutters of the dark slides pull right out, a plan which we much prefer. It is beautifully made, and is especially suitable for ladies' use. Goodall's serrator is a pair of nippers by which vignettes can be quickly cut out of cardboard or paper. Developoids are pellets of compressed pyro, carried in bottle with screw top; it is only necessary to drop one or two of these into two ounces of water and add a few drops of ammonia to be ready to develop any plate. For those who prefer hydroquinone and

alkaline carbonates for development, Messrs. Marion prepare two small bottles filled with these ingredients, the stopper of each bottle acting as a measure. Whether for home work or when travelling, nothing can be more convenient. Marion's dry plates are made in three degrees of rapidity—ordinary, rapid, and instantaneous. We have tested all three and find them excellent. Lastly, as an introduction to photography, and more especially for its description of apparatus, Marion's Practical Guide (which has now reached its fourth edition) is a most useful book.

Samples of *sensitized paper* sent to us by Miss Amy Scott, of King street, Hammersmith, toned very easily, giving prints of a rich purple hue.

The Exposure Book of Mr. Wormald, of Sutton, Surrey, has now reached its fifth thousand; a fact which proves that it is appreciated by users of the camera. Lantern slide masks Mr. Wormald makes in at least two dozen different colors with binding strips to match. The masks are also of varied forms and apertures—a great boon.

Mr. A. H. Baird, of 15 Lothian street, Edinburgh, sends us several articles of photo utility. His "Rainband Spectroscope" is useful, not only in foretelling wet weather but in testing the glass or fabric used for dark room lamps or windows, etc. It shows the Fraunhofer lines in the solar spectrum beautifully; not the least surprising point about it is its low price. Mr. Baird's book slides, plate lifter, magnesium lamp, vise for water tap, syphon and weighing lever are ingenious, well made articles, useful to every photographer.

The dry plates (Mawson & Castle brands), made by Messrs. Mawson & Swan, of Mosley street, Newcastle-on-Tyne, are of excellent quality, and the Mawson plate ranks with the fastest made. The lantern plates of the same firm give us results much like those we used to obtain on collodio-bromide, results we never thought could be attained on gelatine plates. Their bromide paper is equally good.

The Washer (for prints), with Adjustable Rack (for plates), invented by Mr. Jas. Wood, 118 Northbrook street, Liverpool, is a really good thing. It is of large size and strongly made; the prints are kept always on the move, and are freed from hypo in a very short space of time. The rack can be adjusted in a moment to take any size plate, from lantern size up to the largest for which it is constructed.

The novelty of the year, with the Eastman Co., has of course been the substitution of a transparent and extremely thin film of celluloid for the coated paper which they previously employed as a support for the sensitive salt of silver. In this way all trouble of oiling or stripping is avoided.

Another important novelty provided by this Anglo-American firm is the production of their famous hand camera (the Kodak) in two or three larger sizes.

Orthochromatic Plates made in Germany by Obernetter, according to Dr. Vogel's formula, are sold by Mr. J. R. Gotz, 19 Buckingham street, Strand, London. From experiments on flowers, etc., we can testify that these plates give greatly improved renderings of colors without the aid of a yellow screen.

The Luzo is a delightful little hand camera (H. J. Reddings' patent) made by Messrs. Robbinson & Sons, 172 Regent st., London. It is made in three sizes, of which the smallest (that tested by us) takes pictures 2½ inches square, and weighs only seventeen ounces. Films are used; the lens is "rectilinear;" there is a good finder and a capital shutter.

Messrs. R. W. Thomas & Co., 10 Pall Mall, London, produce three series of plates—on "Extra Rapid;" a "Slow Thickly coated;" and an "Extra Rapid Thickly coated." The first excellent for studio work; but we prefer the last named for general work. We find it to be as rapid as any plate ever made, giving a dense "25" on our Warnerke sensitometer. Messrs. Thomas also make Celluloid Films of the same high quality as their plates.

The Ilford Co. make plates and bromide paper of notable excellence and uniformity. Their "Alpha" paper and lantern plates contain chloride of silver, and give a remarkable range of tones, usually distinguished by their warmth.

The cheapest detective camera which we have seen, which is capable of doing good work, is an unpretentious little instrument designed and made by Mr. W. Griffiths, Highgate square, Birmingham. It takes lantern size pictures (3½x3½) upon quarter plates, is provided with three double dark slides and a landscape lens working at F/9, and is covered with waterproof cloth. The Fixed Focus Lantern Slide-making-Camera of the same maker has had a large sale to our knowledge during the past year. All that is requisite being to insert the negative at one end of the camera and the dark slide at the other, the simplicity of the

contrivance has found for it many friends. Encouraged by the success of this instrument, Mr. Griffiths has lately brought out an equally cheap and simple *enlarging camera*. His lantern slides and gummed strips of all sizes, shapes and colors, also commend themselves to the worker.

Mr. W. Tylar, of 57 High street, Aston, Birmingham, whose Metal Dark Slides are so well known, has invented the Lanternscope, a simple and convenient instrument for magnifying and viewing lantern slides with almost stereoscopic effect. Its a handy means of utilizing lantern slides, as a source of pleasure without the trouble of a lantern, we strongly recommend this instrument. It will be in constant use in the family circle of every photographer who possesses one. To Mr. Tylar's ingenuity we also owe the "Aqua poise" for washing negatives and prints; a transparent red varnish ("Anti-Light") for coating glass; a hard flint-like negative varnish which can be applied cold with a brush; a lantern slide developing dish which will hold four plates at once, yet keeps them separate; and divers other novel and useful devices for rendering the life of the photographer "a happy one."

Messrs. Sampson & Son, of Fetter Lane, Fleet street, E. C., have published a splendid edition in two quarter volumes of that famous book, Walton and Cotton's "Complete Angler." When we say that all the illustrations are photogravures, etc., from the negatives of Dr. P. H. Emerson and Mr. George Bankart, the former taking the River Lea, and the latter the Dove and Dovedale; our readers will learn what to expect. Let those who would dissever photography and art, study these volumes.

Dr. Emerson's "English Idyls," a small book published by the same firm, shows him to be a master of prose and of descriptive writing as well as of photography. To those who "care for none of these things" there will simply be most interesting stories of English peasant life.

Messrs. J. H. Skinner & Co., of East Dereham, Norfolk, send us three cameras with which we are much pleased. The wood is beautifully figured, well seasoned mahogany, and all three instruments look remarkably strong and rigid. The whole plate camera extends to twenty-one, and closer to two and three-quarter inches; it has Kinnear bellows. One half-plate (long extension) has a range from nineteen inches to three inches; the other from twelve inches to three inches. The "Cycle" focusser is a capital arrangement for quickly adjusting the distance

between the lens and the ground glass, and its advantages will be especially felt by the users of long focus cameras. The dark slides which accompany these cameras are beautifully made, and have the inside metal partition hinged to the wood-work.

Mr. C. H. Lewis, 60 Lansdowne street, Brighton, continues to act as adviser on photographic matters to all who visit "London supermare." His hydroquinone developer was perhaps the first placed on the market, and continues to rank with the best. We have used it with complete success.

Mr. Lindsay Hemery, Hanover street, Peckham, S. E., can be depended upon to produce from any negative the best prints which it is capable of yielding. His retouching is executed with judgment; and we have been much pleased with some enlargements from his studio.

The London Stereoscopic Co., 110 Regent street, W., are one of the oldest and best known firms in the photo. trade. Their premises in "the finest street in London" have lately been enlarged, and we can assure our American friends who may chance to cross the Atlantic, that Mr. Butler Humphreys, the courteous and clever manager, will there give them a cordial greeting. The company provide "everything" which a photographer can require, and as their clientèle is of a high class, that "everything" is very good. They are the sole English wholesale agents for Carbutt's films. We have lately had the pleasure of testing the famous "Black Band" lenses made by the company, and must pronounce them excellent, and capable of doing all that lenses can do. No fewer than six series of these lenses are made, with from four to eight lenses in each series. With its printers, enlargers, etc., the company turns out work of the best description, a fact of which we have long had evidence.

The Cantilever is the name of a very simple and at the same time effective enlarging apparatus introduced by Mr. W. Hume of 1 Lothian street, Edinburgh. It has bellows front, with ample adjustment, good portrait lens and condenser, and obtains its light from a double wicked oil lamp. In this the wicks are placed with their flat faces to the condenser, and not their edges as is usually the case, and a great amount of control over the lighting of the negative is obtained by adjusting the distance of the lamp from the condenser; a metal cone connecting the light with the condenser. It is cheap both to buy and to work, folds up into a small space, is quickly adjusted and put together and will be found a reliable and effective instrument at a moderate figure.

TABLES.

TABLE OF THE ELEMENTS:

THEIR SYMBOLS, ATOMIC WEIGHTS, AND EQUIVALENTS.

Compiled by A. II. Elliott, Ph.D., from Watts' "Dictionary of Chemistry," 1888.

	Sym- bol.	Atomic Weight.	Equiva- lent.		Sym- bol.	Atomic Weight.	Equiva- lent.
Aluminium	Al	27.02	9.007	Mercury	Hg	199.8	99 9
Antimony	Sb	120.	40.	Molybdenum	Mo	95.8	19 16
Arsenic	As	74.9	24.97	Nickel	Ni	58.6	29.3
Barium	Ba	136.8	68.4	Niobium	Nb	94.	31.33
Beryllium	Be	9.08	4.54	Nitrogen	N	14.01	4.67
Bismuth	Bi	208.	69.33	Osmium	Os	193.	24.125
Boron	B	10.9	3.66	Oxygeu	Õ	15.96	7 98
Bromine	Br	79.75	79.75	Palladium	Pd	106.2	26.55
Cadmium	Cd	112.	56.	Phosphorus	P	30.96	10.32
Cæsium	Cs	133.	132.7	Platinum	Pt	194.3	48.575
Calcium	Ca	39.9	19.95	Potassium	K	39.04	39.04
Carbon	C	11.97	2.99	Rhodium	Ro	104.	26. (
Cerium	Ce	139.9	46.6	Rubidium	Rb	85.2	85.2
Chlorine	Cl	35.37	35 37	Ruthenium	Ru	104.4	26.1
Chromium	Cr	52.4	26.2	Selenium	Se	78.8	39.4
Cobalt	Co	59	29.5	Silicon	Si	28.3	7.
Copper	Cu	63.2	31.6	Silver	Ag	107.66	107.6'
Didymium	Di	143 0	47.8	Sodium	Na	23.	23.
Erbium	E	165.9	55.3	Strontium	Sr	87.3	43.60
Fluorino	F	19.1	19.1	Sulphur	S	31.98	15.99
Gallium	Ga	69.	23.	Tantalum	Ta	182.	60.67
Gold	Au	197.	65.66	Tellurium	Te	125.	62.5
Hydrogen	H	1.	1.	Thallium	Tl	203.64	203.64
Indium	In	113.4	37.8	Thorium	Th	231.87	57.97
Iodine	I	126.53	126,53	Tin	Sn	117.8	58.9
Iridium	Ir	192.5	48.125	Titanium	Ti	48.0	12.
Iron	Fe	55.9	27.95	Tungsten	W	183.6	30.6
Lanthanum	La	138.5	46.17	Uranium	U	240.	60.
Lead	Pb	206.4	103.2	Vanadium	∇	51.2	17.07
Lithium	Li	7.01	7.01	Yttrium	Y	89.6	29.87
Magnesinm	Mg	24.	12.	Zinc	Zn	65.2	32 6
Manganese	Mn	55.	27.5	Zirconium	Zr	90.	45.

NOTE.—The equivalent numbers are the smallest quantities of the element that unite with one part of hydrogen, eight parts of oxygon, or thirty-five parts of chlorine.

SILVER COMBINATIONS.

By A. H. Elliott, Ph.D.

One part of silver, or one part of silver nitrate, is equal to the following parts of other combinations:

	Silver Chlo-	Silver Bro-	Silver	Potassium	Potassium
	ride.	mide.	Iodide.	Chloride.	Bromide.
Silver	1.328	1.740	2.176	.690	1.102
Silver Nitrate	.844	1.106	1.382	.439	.701
	Potassium	Sodium	Sodium	Sodium	Ammonium
	Iodide.	Chloride.	Bromide.	Iodide.	Chloride.
Silver Nitrate	1.538	.541	.953	1.388	.495
	.971	.344	.606	.882	.315
	Ammonium	Ammonium	Cadmium	Cadmium	Cadmium
	Bromide.	Iodide.	Chloride.	Bromide.	Iodide.
Silver Nitrate	.907	1.342	1.363	1.776	2.211
	.576	.853	.538	.800	1.076

GOLD COMBINATIONS.

From Eder's Jahrbuch.

Pure Gold.	Dry Gold Chloride.	Gold Chlo- ride Crystals.	Chloride of Gold and Potassium.	Chloride of Gold and Sodium.
1. .649 .554 .465 .494 .477 .374	1.540 1. .849 .717 .762 .735 .575	1.814 1.178 1.000 .844 .898 .869 .679	2.148 1.394 1.183 1. 1.062 1.024	2.020 1.310 1.113 .941 1. 1.963 .757

SODIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Schiff in *Chemiker Kulender*. Temperature 23° C.(73° F.). The gallon is that of the United States and contains 133.28 ounces of water. The ounce contains 437.5 grains. The first four columns give percentage by weight and weight in 100 volumes of the crystals (10 molecules water) and dry salt respectively.

Grams of Crystals in 100 grms.	Grains of Crystals in 100 c. c.	Grams of Dry Salt in 100 grms.	Grams of Dry Saltin 100 c. c.	Ounces Crystals in one gallon.	Grains Crystals in one fluid ounce.	Specific Gravity	Degree Beaume.	Degree Twaddell.
50	60.2	18.53	22.31	80	262.5	1.204	24	40
50 45 40 35 30 25 20 15 10 5	53.2	16.67	19.75	71	232.	1.183	23	40 38
40	46.5 40.0	14.82	17.30	62 53 45 37	203.	1.162	20 18	32
35	40.0	12.97	14.83	53	174.5	1.141	18	28
30	33.6	$\frac{11.12}{9.26}$	12.32	45	147.	1.120 1.099	16	24
25	27.5	9.26	10.23	37	110.	1.099	13	20
20	21.6	7.41	8 00	29	94.5	1.079	10.5	16
15	21.6 15.9	7.41 5.56	5.83	21	69.5	1.079 1.059	8	12
10	10.4	3.70	8 00 5.83 3.85	29 21 14	45.5	1.039	5.4	8
5	5.1	1.85	1.86	7 3	22.3	1,019	2.7	4
2	2.0	.74	,76	3	8.8	1.008	1	32 28 24 20 16 12 8 4 1.4

POTASSIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Gerlach in *Chemiker Kalender*. Temperature 15° C. (60° F.). The gallon is that of the United States and contains 133.28 ounces of water. The ounce contains 437.5 grains. Dry potassium carbonate is understood in the figures given, and the first two columns give percentages by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
52	81.6	109.	357	1.570	53	114
50	77.2	103.	338	1.544	51	108
45	66.6	89.	291	1.480	47	96
40	56.7	76	248	1.419	43	84 72 58 51
35	47.5	63.	208	1.359	38	72
30	39.0	52.	171	1.301	33	58
25	31.1	41.5	137	1,246	29	51
20	23.8	32.	105	1.193	24	40 28 18
15	17.1	23.	75	1,142	18	28
10	10.9	14.5	44	1.093	12	18
5 2	5.2	7.	23	1.046	7	10
2	2.0	2.7	9	1.018	2.5	3

SATURATED SOLUTIONS.

The following solutions are saturated at 60° F. and the table gives the specific gravity, degrees Beaume and Twaddell, and the percentage of salt by weight.

	Specific Gravity.	Degree Beaume.	Degree Twaddell.	Percentage of Salt by Weight.
Alum (Ammonia) Crystallized	1.048	7	10	11
Potassium Carbonate Dry		52	112	11 52 25
Uxalate	1,262	30 24	52	25
Sodium Carbonate (10 molecules water)	1.199		40	49
" Hyposulphite (5 " ")	1.210	25	40 41	58
" Sulphite (7 " ")	1.197	24	40	49 58 35

SODIUM SULPHITE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon experiments made specially for the construction of this table, temperature 15° C (60° F). The gallon is that of the United States and contains 133.28 ounces of water; the ounce contains 437.5 grains of water. Crystallized sodium sulphite with seven molecules of water is understood in the figures given, and the first two columns give percentage by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
35.1 30 25 20 15 10 5	42.0 35.0 28.5 22.2 16.2 10.5 5.1 2.0	54.2 46.6 38.0 29.6 21.6 14.0 6.8 2.7	184 153 122 97 61 46 22.3 8.8	1.1969 1.1675 1.1381 1.1087 1.0793 1.0499 1.0205 1.0100	24 21 17 11 10.5 7.0 3.0 2.0	40 34 27 17 15 10 4

ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s. g. .7932) and Water, by Weight and by Volume, at 14° R. (6.35° F.).—Meissner.

Alcohol		Gravity of	Gravity of	Part	sof	Gravity of	Specific Gravity of
WIGOHO!	Water	Mixtureby	Mixtureby	Alcohol	Water	Mixture by	Mixture by
	water.	Weight.	Volume.	Alcohor	water.	Weight.	Volume.
100	0	0.7932	0.7932	49	51	0.9196	0.9324
99	1	0.796	0.7969	48	52	0.9219	0.9344
98	2	0.7988	0.8006	47	53	0.9242	0.9364
97	3	0.8016	0.8042	46	54	0.9264	0.9384
96	4	0.8045	0.8078	45	55	0.928	0.9404
95	5 6	0.8074	0.8114	44	56	0.9308	0.9424
94	6	0.8104	0.815	43	57	0.9329	0.9443
93	7	0.8135	0.8185	42	58	0.9350	0.9461
92	8	0.8166	0.8219	41	59	0.9371	0.9478
91	9	0.8196	0.8253	40	60	0.9391	0.9495
90	10	0.8225	0.8286	39	61	0.9410	0.9513
89	11	0.8252	0.8317	38	62	0.9429	0.9529
88	12	0.8279	0.8346	37	63	0.9448	0.9547
87	13	0.8304	0.8373	36	64	0.9467	0.9564
86	14	0.8329	0.840	35	65	0.9486	0.958
85	15	0.8353	0.8427	34	66	0.9505	0.9595
84	16	0.8376	0.8454	33	67	0.9524	0.9609
83	17	9.8399	0.3481	32	68	0.9543	0.9621
82	18	0.8422	0.8508	31	69	0.9561	0.9632
81	19	0.8446	0.8534	30	70	0.9578	0.9643
80	20	0.847	0.8561	29	71	0.9594	0.9654
79	21	0.8494	0.8596	28	72	0.9608	0.9665
78	22	0.8519	0.8616	27	73	0.9621	0 9676
77	23	0.8543	0.8642	26	74	0.9634	0.9688
76	24	0.8567	0.8668	25	76	0.9647	0.970
75	25	0.859	0.8695	24	76	0.966	0.9712
74	26	0.8613	0.8723	23	77	0.9673	0.9723
73	27	0.8635	0.8751	22	78	0.9686	0.9734
72	28	0.8657	0.8779	21	79	9.9699	0.9745
71	29	0.868	0.8805	20	80	0.9712	0.9756
70	30	0.8704	0.8833	19	81	0.9725	0.9766
69	31	0.8729	0.886	18	82	0.9738	0.9775
68	32	0.8755	0.8885	17	83	0.9751	0.9784
67	33	0.8781	0.891	16	84	0.9763	0.9793
66	34	0.8806	0.8934	15	85	0.9795	0.9803
65	35	0.8831	0.8958	14	86	0.9786	0.9813
64	36	0.8855	0.8982	13	87	0.9796	0.9823
63	37	0.8879	0.9096	12	88	0.9306	0.9834
62	38	0.8902	0.9029	11	89	0.9817	0.9846
61	39	0.8925	0.9052	10	90	0.9830	0.9859
60	40	0.8948	0.9075	9	91	0.9844	0.9873
59	41	0.8971	0.9098	8	92	0.9860	0.9888
58	42	0.8994	0.9121	7	93	0.9873	0.9901
57	43	0.9016	0.9145	6	94	0.9897	0.9915
56	44	0.9038	0.9143	5	95	0.9914	0.9929
5E	45	0.9060	0.9103	4	96	0.9914	0.9923 0.9943
54	46	0.9000	$0.9191 \\ 0.9124$	3	97	0.9931	0.9657
53	46			2	98	0.9965	0.9971
52	48	$0.9104 \\ 0.9127$	$0.9237 \\ 0.9159$	î	99	0.9982	0.9985
51	49	0.9137	0.9159	0	100	1.0000	1.0000
50	50	0.6173	0.9201	1	100	1.0000	1.0000

ACETIC ACID.

Quantities of crystallizable acid in mixtures of acetic acid and water of various densities at 15° C.

Parts of Crystal- lizable Acid in 100.	Specific Gravity.	Parts of Crystal- lizable Acid in 100.	Specific Gravity.	Parts of Crystal- lizable Acid in 100.	Specific Gravity.	Parts of Crystal- lizable Acid in 100.	Specific Gravity.
100	1.0553	75	1.0746	50	1.0615	25	1.0350
99	1.0580	74	1.0744	49	1.0607	24	1.0337
98	1.0604	73	1.0742	48	1.0598	23	1.0324
97	1.0625	72	1.0740	47	1.0589	22	1.0311
96	1.0644	71	1.0737	46	1.0580	21	1.0298
95	1.0660	70	1.0733	45	1.0571	20	1.0284
94	1.0674	69	1.0729	44	1.0562	19	1.0270
93	1.0686	68	1.0725	43	1.0552	18	1.0256
92	1.0696	67	1.0721	42	1,0543	17	1.0242
91	1.0705	66	1.0717	41	1.0533	16	1.0228
90	1.0713	65	1.0712	40	1.0523	15	1.0214
89	1.0720	64	1.0707	39	1.0513	14	1.0201
88	1.0726	63	1.0702	. 38	1.0502	13	1.0185
87	1.0731	62	1.0697	37	1.0492	12	1.0171
86	1.0736	61	1.0691	36	1.0481	11	1.0157
85	1.0739	60	1.0685	35	1.0470	10	1.0142
84	1.0742	59	1.0679	34	1.0459	9	1.0127
83	1.0744	58	1.0673	33	1.0447	8	1.0113
82	1.0746	57	1.0666	32	1.0436	7	1.0098
81	1.0747	56	1.0660	31	1.0424	6	1.0083
80	1.0748	55	1.0653	30	1.0412	5	1.0067
79	1.0748	54	1.0646	29	1.0400	4	1.0052
78	1.0748	53	1.0638	28	1.0388	3	1.0037
77	1.0748	52	1.0631	27	1.0375	2	1.0022
76	1.0747	51	1.0623	26	1.0363	ī	1.0007
1							

N. B.—The density of the mixture increases until nearly 25 % of water is present, after which it again decreases. Acetic acid is, therefore, better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of anhydrous sulphurous acid in solutions of different densities.—F. AUTHON.

Specific Gravity	Anhydr'us · Acid in 100.	Specific Gravity	Anhydr'us Acid in 100.	Specific Gravity	Anhydr'us Acid in 100.	Specfic Gravity	Anhydr us Acid in 100.
1.046 1.036 1.031	9.54 8.59 7.63	1.027 1.023	6.68 5.72	1.020 1.016	4.77 3.82	1.013 1.009 1.005	2.86 1.90 0.95

FREEZING MIXTURES.

The following mixtures will be found useful where ice is not readily obtainable:

Ingredients.	Parts by Weight.	Temperature produced. Starting at 10° C.	Diminu- tion of Tempera- ture.
1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	$\begin{bmatrix} 1\\1 \end{bmatrix}$	−16° C.	26° C.
2 Saltpetre Chloride of ammonium (sal ammoniae)	$\begin{bmatrix} 16 \\ 5 \\ 5 \end{bmatrix}$	−12 °	22°
Water Nitrate of ammonia Carbonate of soda	$\begin{bmatrix} 1\\1\\1\\1 \end{bmatrix}$	-19 °	29
4 Snow	5 }		200
Snow	1)	••	45°
Crystallized chloride of calcium Crystallized sulphate of soda Hydrochloric acid	2 { 8 } 5 }	-20°	30°

PERCENTAGE OF REAL AMMONIA IN SOLUTIONS OF DIFFERENT DENSITIES AT 57.2° FAHRENHEIT OR 14° CENTIGRADE.—CARIUS.

Specific Gravity.	Percentage of ammonia.	Specific Gravity.	Percentage of ammonia.
0.8844	36.0	0.9314	18.0
0.8864	35.0	0.9347	17.0
0.88-5	34.0	0.9380	16.0
0.8907	33.0	0.9414	15.0
0.8929	32.0	0.9449	14.0
0.8953	31.0	0.9484	13.0
0.8976	30.0	0.9520	12.0
0.9001	29.0	0.9556	11.0
0.9026	28.0	0.9593	10.0
0.9052	27.0	0.9631	9.0
0.9078	26.0	0.9670	8.0
0.9106	25.0	0.9709	7.0
0.9133	24.0	0.9749	6.0
0.9162	23.0	0.9790	5.0
0.9191	22.0	0.9831	4.0
0.9221	21.0	0.9873	3.0
0.9251	20.0	0.9915	2.0
0.9283	19.0	0.9959	1.0

Antidotes.	Chalk, whiting, or magnesis snapended in water. Plaster or mortar can be used in emergency. Vinegar and water. White and yolk of raw eggs with malls. In emergency, flour paste may be used.	Sulphates of soda or magnesia. Emetic of sulphate of zinc. No certain remedy; cold affusion	over the head and heek most encacions. Sulphate of iron should be applied inmediately. Emetics and magnesia, or chalk. Common salt to be given immedi-	atchy followed by emerics. Bicarbonate of soda, or cabonate of magnesia or chalk; plaster of the apartment beaten up in water.	ral acids. Vomiting should be encouraged, and gruel, arrow-root, and starch	given freely. Cold affusion and artificial respira- tion. No certain remody. Speedy emetic destrable
Characteristic Symptoms.	Hot burning sensation in throat and stomach; vomiting, cramps, and 1 unbuess. Swelling of fongre, mouth, and fances; often followed by stricture of the esophagus. Acrid, metallic taste, constriction and burning in throat and structing throat structs, followed by nauses and structs.	vomiting. Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums. Inscusibility, slow gasping respi-	ration, dialect pupins, and spas- modic closure of the jaws. Smarting sensation. Irritant pain in stomach, and vom- iting. Produces troublesome sores and ulcers. Powerful irritant.	Corrosion of windpipe, and violent inflammation.	ACETIC ACID, concentrated, has as powerful an effect as the mineral acids. Variable in its action; 3 Acrid taste, tightness about the Vomiting grains have been fatal. throat, vomiting.	Effects similar to chloroform. Resemble phosphorus poisoning.
Remarks.	I drachm is the smallest fatal dose known. Vapor of ammonia may cause inflammation of the lungs, the smallest known fatal dose.	ACETATE OF LEAD The sub-acetate is still more poisonous. CIANDE OF POTASSIUM. a. Taken internally, 3 grs.	fatal. b. Applied to wounds and abrasures of the skin. a. Taken internally. b. Applied to slight abrasions of the skin.	2 drachms have been fatal. Inhalation of the fumes has also been fatal. \$ ounce has caused death. I drachm has been fatal.	Variable in its action; 3 Yariable in action; 3 Zarins have been fatal.	When inhaled. 2 grains sufficient to kill a
Poisons.	OXALIC ACID, Including POTASSIUM OXALATE AMMONIA POTASSI POTASSI AMMONIA POTASSI SODA MERCURIC CHLORIDE	ACETATE OF LEAD CXANDE OF POTASSIUM	BICHROMATE OF POTAS- SIUM. NITRATE OF SILVER	NITRIC ACID EXDROCHLORIC ACID	A Iodine.	PYROGALLOL.
	Vege- Caustic table Alkalies, Acids,	lic Salta.	B)9M	Concentrated Mineral Acids,		

TABLES FOR THE CONVERSION OF GRAMMES (OR CUBIC CENTIMETERS) INTO OUNCES AND GRAINS.

CONVERSION OF GRAINS

5008.1984

INTO CRAMMEC

CONVERSION OF GRAMMES

INTO CDAING

INTO	GRAINS.	INIC	GRAMMES.
Grammes.	Grains.	Grains.	Grammes.
		1	
2	30.86		
3	46.29		
4	61.73		
	77.16	-	
	92.59	0	
~	108.03	~	
8	109.40	8	.5184
9	100.00	9	
<i>a</i>		• • • • • • • • • • • • • • • • • • • •	
	05 0044453		
CONVERSION	OF GRAMMES	CONVERSI	ON OF GRAMMES
INTO TRO	Y OUNCES.	INTO AVOI	RDUFOIS OUNCES.
INTO TRO Grammes.	Y OUNCES. Troy ounces.	INTO AVOII Grammes.	Avoirdupois ounces.
Grammes.	Troy ounces.	Grammes.	
Grammes.	Troy ounces.	Grammes. 1	Avoirdupois ounces.
Grammes, 1	Troy ounces.	Grammes.	Avoirdupois ounces.
Grammes, 1	Troy ounces	Grammes. 1 2 3	Avoirdupois ounces.
Grammes. 1 2 3	Troy ounces	Grammes. 1 2 3 4	Avoirdupois ounces
Grammes, 1	Troy ounces	Grammes. 1	Avoirdupois ounces
Grammes. 1	Troy ounces	Grammes. 1 2 3 4 5 6	Avoirdupois ounces.
Grammes. 1	Troy ounces	trammes. 1	Avoirdupois ounces.

The above tables render the conversion of the weights in question a matter of great ease, the error introduced in the last decimal place being trivial.

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324.51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

	equivalent of each part from the table.	
Portions of or	riginal number.	Equivalents in grains
300.	***************************************	4630.
20.		308.6
4.		
.50		
.01		.1524

The required quantity is 5008.2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table and finds 46.30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this hy 100, or gives the required number. In a similar manner, by shifting the decimal place of 30.86 one place to the right we obtain the value in grains of 20 grammes; while the number 61.7 is taken from the table without alteration as the equivalent of 4 grammes. For .50 the table number must have its point shifted to the left, making it 7.716 instead of 77.16; and finally the value of .01 is obtained by shifting the point of 15.43 two places to the left.

The above operations are, in actual practice, performed with considerable speed, the required equivalents being written down one after the other on a scrap of paper, and then added up.

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

From British Journal of Photography Almanac.

With a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognized style will find their labors materially fightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Eqniva- lent weights.	to con-	required to con-	Weight of silver haloid produced by one grain of soluble haloid.	haloid required to pro-	from one
Ammonium bromide Potassium " Sodium " com. " " anh. Zinc " anh. Sodium " Ammonium chloride Potassium " Sodium " Sodium " Cadmium " Cadmium "	98. 119,1 103. 172. 136. 112.1 53.5 58.5 145. 166.1 150.	1.734 1.427 1.650 .988 1.25 1.509 3.177 2.906 1.172 1.023 1.133 .929	,576 .700 .606 1.012 .800 .663 .315 .344 .853 .977 .882 1.076	1.918 1.578 1.825 1.093 1.382 1.670 2.682 2.453 1.620 1.415 1.566 1.284	.521 .633 .548 .915 .723 .600 .373 .408 .617 .707 .638 .778	\begin{cases} 1.106 \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be,

required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:

Bromide of potassium	150	grains.
Iodide of potassium	10	- 41
Chloride of ammonium	10	44
Gelatine	200	6.6

Now, we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each need, we have the following sum:

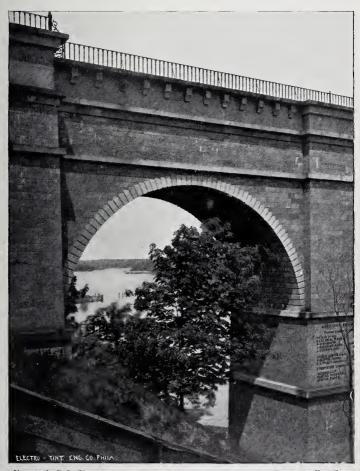
Potassium bromide	$150 \times 1.427 = 214$.	Weight
" iodide	$10 \times 1.023 = 10.23$	silver nitrate
Chloride of ammonium	$10 \times 3.177 = 31.77$	required.
the total quantity of silver nitrate r	required for)	

grains. full conversion.

No. II.

	Sodium Lodide. Cadmium Lodide.	.653 .535	.794 .651	.686 .563	1.146 .94	.906	.75 .615	.356 .292	.39 319	.966	1.107 .907	1 .819	1.22 1
	Potsssium lodide.	.59	.717	.62	1.035	.819	.678	.322	.352	.873	П	.903	1.102
i	Ammonium A. Jodide.	929.	.821	.71	1.186	826.	.776	.369	.403	1	1,145	1.034	1.262
	Sodium Chlorido.	1.675	2.036	1.761	2.94	2.324	1.925	.914	Н	2.478	2.839	2.564	3.128
1	Ammonium Chloride.	1,832	2.226	1.925	3.215	2.542	2.104	1	1.093	2.712	3,104	2.803	3.42
ı	Sinc Bromide.	.87	1.058	.915	1.527	1.207		.475	.519	1.287	1.475	1,332	1.625
	Cadmium Bromide (Anhyd.).	.72	.876	.757	1.265	П	.828	.393	.43	1.066	1.221	1.103	1.375
4	Cadmium Bromide (Coml.).	.57	.692	.599	П	67.	.655	.311	.34	.843	.965	.872	1.064
	Sodium Bromide.	.951	1.156	-	1.07	1.32	1.093	.519	.568	1.408	1.612	1.456	1.776
1	Potassium Bromide.	.823	П	293.	1.444	1.141	.945	.449	167	1.217	1.394	1.259	1.536
	mminommA .ebimort	-	1.215	1.051	1.755	1.387	1.149	.546	.597	1.479	1.695	1.53	1.867
			:	:	com.	anb.	. :	ы	:	:	:	:	:
		bromic	11	3.9	7.7	3	* * *	chlorid	33	iodide	,,	=	7
		Ammonium bromide	Potassium	Sodium	Cadmium	9.9	Zinc	Ammonium chloride	Sodium	Ammonium	Potassium	Sodinm	Cadmium

beaded "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide, we take the number in the same column which stands against the latter salt in the margin, viz., 1.245; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one. Table No. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quanti-ties of the other salts which must be used in lieu of a singlo grain of that particular haloid. Thus, taking the first column, which is how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type)



Negative by D. L. Elmendorf.

Electro-tint Eng. Co.

HIGH BRIDGE, NEW-YORK.



DR. WOODMAN'S TABLE OF VIEW ANGLES.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS
OF THE LENS.

f the quotlent is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees
.282	16	.748	41	1.3	66
,3	17	.768	42	1.32	67
.317	18	.788	43	1.36	68
.335	19	.808	44	1.375	69
.353	20	.828	45	1.4	70
.37	21	.849	46	1.427	71
.389	22	.87	47	1.45	72
.407	23	.89	48	1.48	73
.425	24	.911	49	1.5	74
.443	25	.933	50	1.53	75
.462	26	.954	51	1.56	76
.48	27	.975	52	1.59	77
.5	28	1.	53	1.62	78
.517	29	1.02	54	1.649	79
.536	(30	1.041	55	1.678	80
.555	31	1.063	56	1.7	81
.573	32	1.086	57	1.739	82
.592	33	1.108	58	1.769	83
.611	34	1.132	59	1.8	84
.631	35	1.155	60	1.833	85
.65	36	1.178	61	1.865	86
.67	37	1.2	62	1.898	87
.689	38	1.225	63	1.931	88
.708	39	1.25	64	1.965	89
.728	40	1.274	65	2.	90

This Table has been calculated for the use of those who wish to know the precise *angle of view* included by any particular lens on a given size of plate. Its mode of use will be easily seen by inspection.

DR. SCOTT'S TABLES OF COMPARATIVE EXPOSURES.

The following table, compiled by Dr. J. A. Scott, shows the comparative value of daylight at different hours of the day and seasons of the year, and is intended for use in conjunction with that of Mr. W. K. Burtou:

Table of Comparative Exposures.

Hour o	of Day.	June.	May, July.	April, Aug.	Mar. Sept.	Feb. Oct.	Jan. Nov.	Dec.
1	2	1	1	11	112	2	31	4
11	1	1	1	11	11/2	$2\frac{1}{2}$	4	5
10	2	1	1	1‡	18	3	5	6
9	3	1	11	1 1/2	2	4	*12	*16
8	4	$1\frac{1}{2}$	$1\frac{1}{2}$	2	3	*10		
7	5	2	$2\frac{1}{2}$	3	*6			
6	6	$2\frac{1}{2}$	*3	*6				
5	7	*5	*6					
4	8	*12						

 $^{^\}star$ The accuracy of these figures would be affected by a yellow sunset.

Mr. Burton's Table of Comparative Exposures (slightly altered).

	Sea and Sky.	Open Landscape.	Landscape and Foreground. Buildings.	Heavy Foliage. Foreground. Portrait out of Doors.	Portrait in Studio Light.	Portrait in Ordinary Room.	Under Trees. Fairly Lighted Interiors.	Badly Lighted Interiors.
- F	$\frac{1}{10}$ sec.	½ sec.	1 sec.	2 sec.	16 sec.	1 miu.	$2\frac{1}{2}$ min.	½ hour
3 2	₹ sec.	$1\frac{1}{3}$ sec.	4 sec.	8 sec.	1 min.	4 min.	10 min.	2 hours
6 4	1½ sec.	5 sec.	16 sec.	32 sec.	4 min.	16 min.	40 min.	8 hours

TABLE FOR ENLARGEMENTS.

From the British Journal of Photography Almanac.

Focus		TIMES	OF EN	LARGEM	ENT AN	D REDU	CTION.	
of	1	2	3	4	5	6	7	8
Lens,	inch.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
inches.	4	6	8	10	12	14	16	18
2	4	3	284	$\frac{2\frac{1}{2}}{2}$	22	$2\frac{1}{8}$	$\frac{2^{2}}{7}$	21
$2\frac{1}{2}$	5 5	71/2	10	121/3	15	171	20	$22\frac{1}{2}$
	5	34	31/8	$3\frac{1}{8}$	3	$2^{\frac{1}{12}}$	26	213
3	6	9	12	15	18	21	24	27
	6	41/2	4	3 4	$\frac{3\frac{3}{5}}{}$	$\frac{3\frac{1}{2}}{2}$	337	33/8
31	7	$10\frac{1}{2}$	14	$17\frac{1}{2}$	21	$24\frac{1}{2}$	28	$31\frac{1}{2}$
	7	51	42/8	41/2	41	$-\frac{4\frac{1}{12}}{}$	4_	315
4	8 8	12 6	16	20 5	24	28	32 4‡	36
			51		5 \$	42		41/2
$4\frac{1}{2}$	9 9	$13\frac{1}{6}$	18 6	$\frac{22\frac{1}{2}}{5.5}$	$\frac{27}{5\frac{2}{6}}$	31 1	$\frac{36}{5\frac{1}{7}}$	401
				58		51/4		$\frac{5\frac{1}{16}}{15}$
5	10 10	$\frac{15}{7\frac{1}{2}}$	$\frac{20}{6\frac{2}{8}}$	$\frac{25}{6\frac{1}{4}}$	30 6	35 55	40 5 5	45 55
	11							
$5\frac{1}{2}$	11	$16\frac{1}{2}$ $8\frac{1}{4}$	$\frac{22}{8\frac{1}{8}}$	$\frac{27\frac{1}{2}}{6\frac{7}{4}}$	$\frac{33}{6\frac{1}{2}}$	$\frac{38\frac{1}{2}}{6\frac{5}{12}}$	$\frac{44}{6^2}$	$49\frac{1}{6}$ 6^{3}
	12		$\frac{-\frac{3}{24}}{24}$	30	36		48	54
6	$\frac{12}{12}$	18	8	$7\frac{1}{2}$	$7\frac{1}{6}$	$\begin{array}{c c} 42 \\ 7 \end{array}$	67	63
	14	21	28	35	42	49	56	63
7	14	101	91	84	83	81	8	77
8	16	24	32	40	48	56	64	72
	16	12	103	10	$9\frac{2}{5}$	91/3	91	9
9	18	27	36	45	54	63	72	81
ð	18	13½	12	$11\frac{1}{4}$	104	$10\frac{1}{2}$	10%	101/8

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without roublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration: A photographer has a carte to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—7½. The greater of those is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To reduce a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of feel lengths, look out for 6 in this column and multiply by 2, and so on with

any other numbers.

TABLE OF EXPOSURES FOR ENLARGING AND REDUCING.

COMPILED BY MR. E. FERRERO, (CAMERA CLUB, LONDON.)

Showing the exposures to be given to Eastman's and Ilford slow bromide paper according to the actual intensity ratio of the lens, and to the actinic power of light, as measured by Stanley's Actinometer.

Ilford rapid bromide paper requires one-fiftieth of the exposures indicated, gelatino-bromide plates of ordinary rapidity, one-fifteenth to one-twentieth, and Mawson and Swan's lantern plates three times.

Stanley's Actinometer.	f/16	f/18	f/20	f/22	f/24	f/26	f/28	f/32	f/36	f/40	f/44	f/48	f/5
10.0	m.s.		m.s.	m.s.	m. s.	m. s.	m.s.				m. s.		m.
10 Seconds.	0 9		0 14	0 17	0 20	0 23	0 27		0 45	0 55	1 7	1 20	1 :
15 "	0 13		0 21	0 25	0 30	0 34	0 40		1 7	1 23	1 41	2 0	2:
20 ''	0 18		0 28	0 33	0 40	0 46	0 54		1 30	1 51	2 15	2 40	3
25 "	0 22			0 42	0.50	0 58	1 8	1 30	1 52	2 18	2 48	3 20	3
30 ''	0 27			0.50	1 0	1 9	1 21	1 48	2 15	2 46	3 22	4 0	4
40 '	0 36			1 15	1 19	1 33	1 48	2 24	3 0	3 42	4 29	5 20	6
50 ''	0 45			1 24	1 40	1 54	2 15	3 0	3 42	4 37	5 36	6 40	7 .
60 **	0 55		1 23	1 38	1 59	2 18	2 42	3 36	4 30	5 33	6 44	8 0	9 :
70 "	1 3	1 18	1 37	1 54	2 19	2 42	3 9	4 12	5 15	6 28	7 52	9 20	10 :
80 "	1 12	1 30	1 50	2 10	2 38	3 7	3 36	4 48	6 0	7 24	8 58	10 40	12 :
90 "	1 21	1 40	2 5	2 30	2 59	3 29	4 4	5 24	6 42	8 19	10 5	12 0 :	14
100 "	1 30	1 50	2 20	2 50	3 20	3 48	4 30	6 0	7 22	9 12	11 12	13 20 :	15 3
120 "	1 48	2 12	2 46	3 16	4 0	4 36	5 24	7 12	8 52	11 5	13 28	16 0 1	18 4
140 "	2 6	2 35	3 13	3 48	4 37	5 23	6 18	8 24	10 30	12 56	15 43	18 40 ;	21 :
160 "	2 24	3 0	3 40	4 20	5 17	6 14	7 12	9 36	12 0	14 48	17 55	21 20 2	25
180 "	2 42	3 20	4 10	4 58	5 58	6 58	8 7	10 48	13 24	16 36	20 10	24 0 2	28
200 **	3 0	3 40	4 40	5 36	6 40	7 36	9 0	12 0	14 44	18 25	22 24	26 40 8	31
225 "	3 22	4 10	5 15	6 18	7 30	8 33	10 10	13 30	16 36	20 48	25 12	30 0 3	35 1
250 "	3 45	4 36	5 50	7 0	8 19	9 30	11 15	15 0	18 24	23 0	28 0	33 20 3	39
275 "	4 7	5 5	6 25	7 42	9 9	10 27	12 27	16 30	20 18	25 20	30 48	36 40 4	12 5
300 "	4 30			8 24					22 6		33 36		

TABLE OF EXPOSURES FOR ENLARGING AND REDUCING—Continued.

	nley's nometer.	f/	56	f/	60	f	64	f	/68	f	72	f/	76	f/	80	f/3	84	f/	88	f/	92	f/	96	f/1	100
		m.	s.	m.	s.	m	. s.				. s.		. s.		. B.		8.	m.			s.		. s.	m	
10 S	econds.	1	48	2	5	2	22	2	40	3	0	3				4	4	4	28		54		20		4'
15	64	2	42	3	7	3	33	4	0	4	30	5	- 0	5	33	6 8	6	6	42	7	21	8	0	8	4(
20	66	3	37	4	10	4	44	5	20	6	0	6	40	7	24		9	8	57		48	10	40	11	33
25	16	4	30	5	17	5	55	6	40	7	30	8		9	15		9	11	12	12	17	13		14	
30	4.6	5	25	6	15		5	8	0	9	0	10		11	- 6	12	12	13		14	42	16	0		
40	4.6	7	12	8	20	9	28	10	40	12	0	13	22	14			17	17	54	19		21	20	23	
50	6.0	9	0	10	34	11	50	13	22	15	0	16	42		30			22	23		33			28	
60	6.6	10	50	12	30	14	10	16	1	18	0	20	2	22	12	24	25	26	50	29	24	32		34	
70	66	12	40	14	34	16	33	18	42	21	0	23	23	25	54		30		19	34	18	37	20	40	2
80	6.6	14	24	16	48	18	55	21	22	24	0	26	43	29	36	32	33	35	48	39	12		40	46	
90	44	16	12	18	45	21	18	24	- 3	27	0	30	3	33	18	36	38	40	17	44	10	48	0	52	0
100	44	18	0	21	8	23	40	26	44	30	0	33	24	37	0	40	42	44	46	48	56	53	20	57	48
120	6.6	21	40	24	58	28	21	32	-0	36	0	40	5	4.4	24	48	50	53	40	58	48	64	0	69	0
140	4.6	25	20	29	7	33	6	37	23	42	0	46	45	51	48	57	0		39	69	0		40	81	0
160	16	28	48	33	17	37	50	42	43	48	0	53	27	59	12		7		36	78	0	85	0	92	0
180	6.6	32	36	37	30	42	35	48	5	54	0	60	6	66	36	73	15	80	20	88	0	96	0	104	0
200	6.6	36	0	42	17	47	20	53	28	60	0	66	47	74			24	89	0	98		106		116	0
225	. 6	40	48	46	50	53	15	60	20	67	27	75	8		15		31	100		110		120		130	0
250	66	45	0	52	50	59	10	66	40	74	55	83	30	92	30	101		111		122		133		144	0
275	6.6	49	51	58	13	65	5	73	30	82		91	0	101	45	111		124		135		146		159	0
300	4.6	54	Ō	63	26	71	0	80	0	89	55	100	10	111	0	122	6	134	0	147	0	160	01	174	0

THERMOMETRIC TABLES:

Showing the Assimilation of the Thermometers in Use Throughout the World.

	1	f 1	1 .	1	1
Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80.0	212.0	49	39.2	120.2
99	79.2	210.0	48	38.4	118.4
98	78.4	208,4	47	37.6	116.6
97	77.6	206,6	46	36.8	114.8
96	76.8	204.8	45	36.0	113.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.8	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
89 88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
87 86 85	68.8	186-8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83 82	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80 79	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78 77 76	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75 74 73	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72.	57.6	161.6	21	16.8	69.8
71 70	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
68 67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
66 65 64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62 61	-49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	Š	7.2	48.2
59	47.2	138.2	š	6.4	46.4
58	46.4	136.4	17	5.6	44.6
57	45.6	134.6	9 87 6 5 4 3 2	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	â	2.4	37.4
53	42.4	127.4	2	1.6	36.5
52	41.6	125.6	ĩ	0.8	33.8
51	40.8	123.8	l ō	0.0	32.0
50	40.0	122.0		1	0

PHOTOGRAPHIC SOCIETIES OF THE BRITISH ISLES AND BRITISH COLONIES.

The following list proves the rapid spread of photography, for it includes the names of 183 societies, as compared with 120 in last year's volume—an increase of fifty per cent.

ABERDEEN AND NORTH OF SCOTLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1885. The annual meeting is held in April in the Café Shiprow. President, John Milne. Vice-President, Robert Houston. Council, T. W. Binner and Alex. McKilligan. Treasurer, Alex. Edward, Jun. Secretary, James Main, 8 Elmfield Avenue, Aberdeen.

ABNEY CAMERA CLUB.—President, Rev. W. Spensley. Hon. Secretary, F. H. Leeds, 29 Bouverie Road, Stoke Newington, London.

Albany Institute Amateur Photographic Society.—Established 1883. Meetings January 1 and every other Tuesday throughout the year, in the Institute, 345 Albany Road, Walworth, S. E. President, G. S. Martin. Committee, G. H. A. Bucknole, H. Harvey, W. Liberty, J. S. Simon. Curator, W. Rhodes. Librarian, W. A. Cordrey. Hon. Secretary and Treasurer, Alfred B. Gee, 19 Drakefell Road, Nunhead, S. E.

ALTRINCHAM AMATEUR PHOTOGRAPHIC SOCIETY.—Hon. Seeretary, Jas. Davenport.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1861. No stated times for meetings. President, His Royal Highness the Prince of Wales. Vice-Presidents, H. S. H. The Duke of Teek, G. C. B., The Most Noble the Marquis of Drogheda, General the Right Hon. the Lord de Ros, the Right Hon. the Earl of Rosse, F. R. S., James Glaisher, Esq., F. R. S., F. R. A. S., etc. Council, Sir Spencer Maryon Wilson, Bart., Sir J. Whittaker Ellis, Bart., M. P., John Aird, Esq., M. P., W. D. Howard, Esq., F. I. C., Charles Stephens, Esq., M. A. (Oxon), Walter Wood, Esq., F. R. G. S., W. S. Hobson, Esq., R. O. Milne, Esq. Hon. Secretary, Arthur James Melhuish, Esq., F. R. A. S., and F. R. Met. Soc. Offices, 58 Pall Mall, London, S. W. (opposite Marlborough House).

AMATEUR PHOTOGRAPHIC ASSOCIATION OF VICTORIA, MELBOURNE.—The Association meets on the second Tuesday in each month at the Royal Society's Hall, Victoria street, Melbourne. Visitors from British, American, or Continental Societies will be made welcome at any of the meetings. President, E. C. Bell. Viee-Presidents, F. A. Kernot and John Lang. Committee, J. H. Mulvany, H. C. Ward, J. McEwan, A. M. Henderson, E. J.

Hughes. Hon. Librarian, E. A. Walker. Scientific Custodian, R. W. Harvie. Hon. Treasurer, J. J. Fenton. Hon. Secretary, J. H. Harvey, 278 Victoria Parade, East Melbourne.

AMATEUR PHOTOGRAPHIC FIELD CLUB. — Established 1858. Monthly outings during the Summer. Indoor meetings during the Winter. Annual meeting in March. *President*, W. Wainwright. *Treasurer and Secretary*, B. G. Wilkinson, Jun., 151 Bermondsey street, London, S. E.

AMATEUR PHOTOGRAPHIC SOCIETY OF MADRAS.—President, F. Dunsterville, Rayapuram, Madras. Secretary and Treasurer, T. Wake, Flower's Road, Egmore, Madras.

AUCKLAND PHOTOGRAPHIC SOCIETY, N. Z.—Secretary, J. H. Sinclair, Auckland, New Zealand.

AYLESBURY AMATEUR PHOTOGRAPHIC SOCIETY.—Hon. Secretary, J. F. Roche, 2 St. Mary's Square, Aylesbury.

BATH PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings held on the lastWednesday evening in each month at the Royal Literary and Scientific Institution, Terrace Walks, Bath, where a spacious dark room, reading room and laboratory is open daily. Excursions during the Summer months. Annual general meeting on the last Wednesday in February. Eighty members. President, W. Pumphrey. Vice-President, Austin J. King. Committee, P. Braham, F. Greene, A. F. Perren, W. Pitt, G. F. Powell. Secretary and Treasurer, W. Middleton Ashman, Royal Literary and Scientific Institution, Terrace Walks, Bath.

BATLEY AND DISTRICT PHOTOGRAPHIC SOCIETY.—President, H. Spedding. Hon. Secretary, H. Marnith, Batley.

BELFAST Y. M. C. A. CAMERA CLUB.—President, Thos. Workman. Hon. Secretary, Jas. H. Hamilton, 3 Eden Terrace, Shankhill Road, Belfast.

BIRKENHEAD PHOTOGRAPHIC ASSOCIATION.—Established 1884. Meetings held on the second Thursday in each month at the Hamilton Rooms, Birkenhead, at 7:30 p.m. Annual meeting, second Thursday in November, at 7:30 p.m. President, P. H. Phillips. Vice-President, H. H. Williams. Council, H. Lupton, H. Wilkinson, T. S. Mayne, F. N. Eaton, F. Hope Jones, W. Faltin, J. L. Mackrell, Paul Langé. Librarian, J. A. Forrest. Auditors, G. A. Carruthers and A. Bradbury. Treasurer, F. Evans. Secretary, C. B. Reader, 5 Cook street, Liverpool.

BIRMINGHAM PHOTOGRAPHIC SOCIETY. — Established 1884. Meets at the Grand Hotel, Birmingham, on the second and fourth Thursdays in the months October to April, and on the fourth Thursdays only in the Summer months, May to September, business commencing at 7:30 P. M. Annual meeting, fourth Thursday in November. 200 members. President, J. B. Stone, J. P., F. L. S., etc. Vice-Presidents, E. H. Jaques, B. Karleese, W. J. Harrison, F.G.S. Council, J. J. Button, W. T. Horton, S. G. Mason, E. C. Middleton, G. A. Thomason, A. A.

Bonchill, W. J. J. Nicoll, D. Sc., W. Rooke. *Treasurer*, Thomas Taylor. *Secretaries*, J. H. Pickard, 361 Moseley Road, and A. J. Leeson, 20 Cannon street.

BLACKBURN LITERARY CLUB (PHOTOGRAPHIC SECTION).—Established 1884. Each section of the club is managed by its own Secretary. Meetings and excursions at intervals during the season. President, T. J. Syckelmoore, B.A. Vice-President, Charles Smithies, Hon. Secretary, E. S. Johnson, Literary Club, Blackburn.

Blackburn and District Photographic Society.—Hon. Secretary, H. P. Tattersall, 82 Preston New Road, Blackburn.

Bolton Photographic Society.—Established 1879. Ordinary meetings held at the Baths, Bridgman street, on the first Thursday in each mouth from September to May, at 8 p.M. Annual meeting, first Thursday in October. President, J. R. Bridson. Vice-Presidents, E. N. Ashworth, R. Harwood, W. Banks, Walter Knowles, Rev. J. W. Cundey, Thomas Parkinson. Council, J. Boothroyd, W. Laithwaite, T. Davis, J. Leach, Charles J. P. Fuller, J. Lomax, Dr. Johnston, R. Mercer. Hon. Treasurer, C. K. Dalton. Hon. Secretary, B. H. Abbatt, 12 Corporation street, Bolton.

Bolton Photographic Club.—Established 1883. Meetings are held every Tuesday evening, at the studio of the Club, Chancery Lane, Bolton, at 8 p. m. President, Jabez Boothroyd. Vice-President, Thomas Jukes. Committee, Messrs. Hawksworth, Banks, Bradshaw, Ashworth, Sewell. Treasurer, John Bradshaw. Secretary, James Slater, Town Hall Square, Bolton.

BOLTON CAMERA CLUB.—President, John Johnston, M. D. Hon. Secretary, Thos. Parkinson, Jun., 117 Westbrook street, Bolton.

Bradford Amateur Photographic Society.—Established 1882. Meetings held at 50 Godwin street on the second Tuesday in the month, from October to June inclusive. Annual meeting, October. President, Alexander Keighley. Vice-Presidents, Rev. Dr. Aston, LL. D., and George Roberts. Committee, D. G. Law, H. Forsyth, M. B. Wallace, W. H. Scott, W. S. Smith, J. Sonnenthal, Rev. T. Mellodey, M. A., H. H. Tankard. Hon. Sccretary and Treasurer, Walter Leach, F. C. S., 50 Godwin street.

Bradford Photographic Club.—*President*, Charles Holmes. *Hon. Secretary*, Frederick North, 27 Kirkgate, Bradford.

Brechin Photographic Association.—Established 1888. Meets in the Mechanics' Institute on the first Wednesday of each month. Annual meeting, first Wednesday of September. 48 members. President, William Shaw Adamson, Careston Castle. Vice-Presidents, John Anderson, M.B., C.M., and R. A. Scott, M.A. Council, George Mackie, William Lawrence, Henry Braid. Curator, J. C. Middleton. Treasurer, William Stewart, Jun. Sceretary, James D. Ross, 13 Park Road, Brechin, N.B.

Brighton Photographic Society.—Established 1889. Annual meeting, second Tuesday in February. Ordinary meetings, second and fourth Tuesdays, at 8:15 p.m., at the New Road Lecture Hall. During Summer, May to September, second Tuesday in the month, at 8:15 p.m. 60 members. President, W. H. Rean. Vice-President, W. Jago. Committee, E. J. Bedford, D. E. Caush, J. H. Graham, S. B. Hardcastle, G. Perren, W. W. Mitchell, F. Tate, R. Wicks, A. Webling. Treasurer, J. P. Slingsby-Roberts. Hon. Secretary, A. H. C. Corder, 42 Montpelier Road, Brighton.

BRISTOL CAMERA SOCIETY.—Meetings at University College, Tyndall's Park, Bristol, on second and fourth Thursdays in each month, at 7:30 P.M. *President*, Harvey Barton. *Hon. Secretary*, T. T. Genge, 68 Berkeley Road, Bishopston, Bristol.

BRISTOL AND WEST OF ENGLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1872. Meetings, third Wednesday in each month, at Queen's Hotel, Clifton, at 7:30 p.m. Annual meeting in January. President, H. A. H. Daniel. Vice-Presidents, Colonel Playfair and E. Brightman. Council, Messrs. Norgrove, Phillips, Wright, and the Officers. Treasurer and Secretary, F. Bligh Bond, Fern Hollow, Stoke Bishop, near Bristol.

British Association for the Advancement of Science.—Established 1831. In 1890 will meet at Leeds, September 3. President, Professor W. H. Flower, C.B., F.R.S. President-elect, Sir F. A. Abel, C.B., F.R.S. Treasurer, Professor A. W. Williamson, F.R.S. General Secretaries, Sir Douglas Galton, K.C.B., and A. Vernon Harcourt, F.R.S. Secretary, A. T. Atchison, M.A. Association Headquarters, 22 Albemarle street, London, W.

BRIXTON AND CLAPHAM CAMERA CLUB.—Established 1889. The ordinary meetings are held on alternate Friday evenings at 8 p.m., at 35 Bedford Road, Clapham, S.W. Hon. Secretary and Treasurer, Fred. W. Levett, 126 Lowden Road, Herne Hill, S.E.

BROCKLEY AND ST. JOHN'S SCIENTIFIC SOCIETY.—Established 1872. Meetings, first and third Thursdays in each month at St. John's Church Room, Lewisham High Road, S.E. Annual meeting, third Thursday in November. President, A. E. Lamb. Vice-Presidents, W. J. Spratling, B.Sc., F.G.S., F. J. Taylor, M.B. (Lond.), Jenner Weir, F.L.S., F.Z.S. Photographic Chairman, Malcolm Stodart. Photographic Secretary, Lewis M. Biden, 11 Leadenhall street, E.C.

BURNLEY PHOTOGRAPHIC SOCIETY.—Established 1885. Ordinary meetings are held on the last Wednesday in each month, at 7:30 P.M., in the Society's Rooms, Bank Chambers, Hargreaves street, Burnley. President, J. Butterworth, J.P. Vice-Presidents, D. Drew and J. C. Brumwell, M.D., J.P. Council, All Officers and the following: W. Chadwick, A. Howarth, A. Lancaster, J. Holgate, S. Edmondson, J. Pickles. Treasurer, C. J. Howson, Secretary, William Sutcliffe, 7 Bank Hall Terrace, Burnley,

Burton-on-Trent Amateur Photographic Association.— Established 1883. Meetings, at the Institute, Union street, fourth Thursday in each month. *President*, Rev. J. Bramell. *Hon.* Sceretary, S. Sims, Brandstone Road, Burton-on-Trent.

BURTON-ON-TRENT NATURAL HISTORY AND ARCHÆOLOGICAL SOCIETY (PHOTOGRAPHIC SECTION).—Meetings on first Wednesday of the Winter months in the Society's Room, 47 High street, Burton-on-Trent. *President*, C. O'Sullivan, F.R.S. *Hon. Secretary*, A. L. Stern, B.Sc., F.C.S., etc.

Bury Photographic and Arts Club.—Established 1882. Ordinary meetings held every third Wednesday in each month at 7:30 p. m. Annual meeting, third Wednesday in October. President, W. Booth. Vice-Presidents, F. Cooper and W. S. Barlow. Council, R. Grundy, Sen., R. Grundy, Jun., F. W. Livsey, E. W. Mellor, C. H. Openshaw. Treasurer, J. Newbold. Secretary, Roger Wood, Bolton street, Bury.

CAMBRIDGE UNIVERSITY PHOTOGRAPHIC SOCIETY.—Established 1882. Meetings, irregular. President, W. N. Shaw, M. A. Vice-President, Rev. A. Rose, M. A. Committee, W. H. Banks, A. H. Newstead, S. R. C. Bosanquet, G. W. Hardy. Hon. Secretary, A. H. Cowan, 62 Park street, Cambridge.

Camera Club.—Established 1885. 21 Bedford street, W. C. The Club is open on week days from 10 A. M. to midnight, and on Sundays from 10 A. M. to 11 P. M. It combines the ordinary advantages of a club with the appliances and conveniences of a photographic and scientific society, including the use of a well appointed dark room, available to members at all times, enlarging apparatus, etc. A Club Journal is published and sent free monthly to members. Meetings for photographic discussion are held every Thursday at 8 P. M., from October to May. Summer, outdoor meetings. Social gathering on the first Monday of each month from October to May. Number of members, 600. Annual Photographic Conference. President, Captain W. de W. Abney, C. B., D. C. L., R. E., F. R. S. Committee, Sir George Rendlesham Prescott, Bart. (Chairman), Francis Cobb (Vice-Chairman), The President and the Hon. Secretaries (ex-officio). Hon. Secretaries, George Davison and W. A. Greene. Hon. Librarian, Lyonel Clark. Hon. Managing Director, E. Ferrero, 21 Bedford street, Covent Garden, W. C.

CARDIFF AMATEUR PHOTOGRAPHIC SOCIETY.—Meetings every alternate Wednesday in Winter. Outings, every alternate Saturday in Summer. 80 members. President, T. Mansel Franklen. Vice-Presidents, Jonas Watson, Walter Insole, S. W. Allen, A. Kellar. Council, W. H. Kitchen, E. Lewis, C. Murrel, C. F. Gooch, John Storrie, John Weaver, Rev. M. Whiteside, T. H. Faulks, G. C. Shipton, H. Dyer, W. Furley, John Neale, F. Heitzman, E. H. Bruton, A. Pinheira. Treasurer, W. Foster. Secretaries, George H. Bedford and George H. Wills, 127 Bute Road, Cardiff,

Carlisle and County Amateur Photographic Society.—Established 1885. Meetings are held in the Cathedral Hall, Castle street, Carlisle, on first Tuesday in the month. President, the Mayor. Vice-President, C. S. Hall, M.R.C.S., F.M.S. Committee, T. Bushby, J. Robson, J. H. Coward, William Gibson, J. G. Moffett, R. Tweedy. Treasurer, John Forsythe. Hon. Secretary, H. Y. Thompson, L.S.A. Hon. Assistant Secretary, John S. Atkinson, 33 Princess street, Carlisle.

CHELTENHAM PHOTOGRAPHIC SOCIETY.—Established 1865. Meetings on the second Thursday in each month from October to May, inclusive. *President*, C. E. F. Nash, M.A. *Committee*, The Officers, and Baynham Jones, G. S. Penny, W. W. Whittard. *Treasurer*, J. Bull. *Secretary*, W. C. Beetham, 22 Promenade Villas.

CHESTER SOCIETY OF NATURAL SCIENCE AND LITERATURE (PHOTOGRAPHIC SECTION).—Established 1887. Meetings held once a month in the Lecture Theatre of the Grosvenor Museum, Chester. Chairman, E. W. Parnell, F.C.S. Committee, A. G. Ayrton, E. W. Cowan, F. Evans, Rev. A. H. Fish, B.A., B.Sc., P. W. J. Fawcus, Dr. Stolterfoth, M.A., C. W. Townshend. Treasurcr and Secretary, J. H. Spencer, 36 Bridge street, Chester.

CLYDESDALE CAMERA CLUB.—Hon. Secretary, Miss Burns, Castle Wemyss, Wemyss Bay, N. B.

COLCHESTER CAMERA CLUB.—President, Rev. C. L. Acland, M.A. Hon. Secretary, H. Wright, 18 Head street, Colchester.

CORNISH CAMERA CLUB.—Established 1889. Ordinary meetings, first Tuesday in each month at the Royal Cornwall Geological Museum, at 7:30 P. M. Annual meeting, second Tuesday in October. President, W. E. Baily, F.L.S. Vice-President, B. Vivian, M.R.C.S. Council, Colonel J. Hesketh Biggs, Netherton H. Symons, John Bramwell, Jun. Treasurer, W. H. Percy. Secretary, A. K. Barnett, 11 Penrose Terrace, Penzance.

COVENTRY DISTRICT CYCLISTS (PHOTOGRAPHIC SECTION).— Established 1889. Outdoor excursions and meetings for discussion and general business once a week alternately during the season. *President*, F. W. Dew. *Treasurer and Secretary*, Fred. J. Harker, Avon House, Holyhead Road, Coventry.

COVENTRY AND MIDLAND PHOTOGRAPHIC SOCIETY.—Established 1883. Meetings on the first Wednesday in each month at the Dispensary. Annual meeting in November. Number of members, 45. President, Councillor W. Andrews. Vice-Presidents, H. Sturmey, G. Winstanley, F. W. Hardy, H. W. Jones, F.C.S. Council, A. B. Clarke, C. H. Waters, J. Mountfort, W. R. Goate. Treasurer, W. L. J. Orton. Secretaries, F. W. Dew, The City Studio, Coventry, and F. J. Harker, 40 Smithford street, Coventry.

CREWE AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1889. Meetings at the Mechanics' Institute on the last Monday but one in the month. Annual meeting in February. *President*, Rev.

W. G. Rainsford, M.A. Vice-Presidents, Colonel Cotton, Major Gossett, W. W. G. Webb. Council, W. Bennett, J. Lewis, F. C. Tipler, J. R. Jones, S. H. Hayward, T. Gorrell, G. Elliott. Treasurer, W. Bispham. Secretary, W. A. Whiston, 13 Union street, Crewe.

Croydon Microscopical and Natural History Club (Photographic Section).—Established 1870. Headquarters, Public Hall, Croydon. Number of members, 45. Meet first Friday in each month. President, Ed. Lovett. Committee, A. H. Allen, Kenneth McKean, J. W. Brown. Hon. Secretary, W. Low Sarjeant, 7 Belgrave Road, South Northwood, S. E.

CROYDON CAMERA CLUB.—President, H. Maclean, Gratwicke Lodge, Birdhurst Road, South Croydon. Meetings in the Public Hall, Croydon.

Darlington Photographic Society.—Established 1887. Ordinary meeting, the second Monday in the month at the Trevelyan Hotel. Annual meeting, first Monday in November. President, E. Ensor. Vice-President, G. Newby Watson. Council, J. A. Fothergill, H. W. Holles, R. A. Luck, W. F. K. Stock. Treasurer, T. Howlett. Hon. Secretary, W. Garritte Brewis, Blytheville, Darlington.

Dartmouth Amateur Photographic Society.—President, Roger Mostyn. Committee, E. Anwyl, E. Bearcroft, B. Michelmore, C. Sims, J. H. Spanton, William Simpson, G. R. Whitaker, R. Whitaker. Hon. Secretary and Treasurer, George Barnston.

DERBY PHOTOGRAPHIC SOCIETY.—Established 1884. Ordinary meetings held on the second Tuesday in each month at 8:30 p. M. Annual meeting, second Tuesday in January, at the Society Rooms, Derwent Buildings, Derby. President, Captain W. de W. Abney, C.B., R.E., F.R.S., etc. Vice-Presidents, C. Bourdin, R. Keene, T. Scotton. Committee, F. Cooper, J. A. Cope, C. B. Keene, E. J. Lovejoy, R. L. Warham, R. Woods. Treasurer, A. B. Hamilton. Secretary, C. J. Chadwick, Sydney Villas, Mill Hill Road.

Devon and Cornwall Camera Club.—Established 1888.—Club Rooms, The Athenaeum, George street, Plymouth, where the members have the use of lecture hall, library, and dark rooms. Lantern evenings and Lectures every alternate Monday during the Winter. Frequent excursions during the Summer. Vice-Presidents, John D. Pode, M.A., and G. Soltau-Symons. Council, Robert Murray, C. E., W. Gage Tweedy, B. A., Major R. Barrington Baker, O. S. D., Charles Aldridge, M. D., David Roy, Robert Burnard, E. H. Micklewood, J. S. Hawker, J. P. Hon. Treasurer, Arthur A. Carnell, Bedford Villa, Plymouth. Joint Hon. Secretaries, Major R. Barrington Baker, H. M., Gun Wharf, Devenport, and W. Gage Tweedy, 8 Athenaeum Terrace, Plymouth.

DEWSBURY AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Ordinary meetings held at the Victoria Café on the

second Thursday in each month at 7:30 p. m. Annual meeting held in January. Excursions during Summer months. President, T. G. Beaumont. Vice-President, A. S. Marriott. Committee, E. Scargill, F. Craven, W. B. Thornes. Treasurer and Secretary, George Kilburn, 51 Eastfield, Batley Carr, Dewsbury.

Doncaster Microscopical and General Scientific Society.—Established 1880. The meetings of the Society, unless otherwise specified, will be held in the Robing Room, Guildhall, at 8 p. m. President, J. M. Kirk. Vice-Presidents, Rev. W. R. Weston, J. Mitchell Wilson, M. D., W. Roberts, J. G. Walker. Committee, T. J. Hasselby, T. H. Easterfield, B. A., W. E. Atkinson. George Winter, Rev. T. E. Lindsay, B.A., F.C.S., F.G.S., Rev. George Smith, M.A. Secretary and Treasurer, M. H. Stiles, 2 French Gate.

DORSET AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1886. President, W. Miles Barnes, M. A. (Cantab). Committee, Dr. George and Rev. R. M. Lee. Secretary, Rev. T. Perkins, M.A., F.R.A.S., Head Master, Grammar School, Shaftsbury.

DUKINFIELD PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings held at the Co-operative Hall, Astley street, on the fourth Tuesday in each month, at 7:30 p. m. Annual meeting fourth Tuesday in April at 7:30 p. m. President, John T. Lees. Vice-Presidents, John Ashworth, C.C., J. H. Brook. T. Glazebrook. Council. S. T. Ainsworth, W. Chadwick, G. H. Dean, J. W. Hadfield, W. Jenkinson, J. Leach. Treasurer, John Winterbottom. Secretary, W. H. Shirley, Commercial Buildings, King street, Dukinfield.

Dundee and East of Scotland Photographic Association.—Established 1879. Meetings are held on the first Thursday of each month from October till May, both inclusive, in Lamb's Hotel, Dundee, at 8 p. m., and three outdoor meetings during Summer. President, J. K. Tulloch, M.B. Vice-Presidents, J. Mathewson and J. D. Cox. Council, W. Baxter, J. C. Cox, W. F. Hill, G. D. Macdougald, D. Ireland, G. G. Maclaren, L. Ower, W. Salmond, A. Stewart, W. D. Valentine. Treasurer and Secretary, V. C. Baird, Broughty Ferry, N. B.

DUNDEE AMATEUR PHOTOGRAPHIC ASSOCIATION.—President, John Baxter. Hon. Secretary, A. S. Forsyth, 3 Elizabeth street, Dundee.

EAST DULWICH AND PECKHAM PHOTOGRAPHIC SOCIETY.—President, F. W. Edwards. Hon. Secretary, S. W. Gardner, 7 Barry Road, East Dulwich, S. E.

EDINBURGH PHOTOGRAPHIC CLUB.—Established 1881. The ordinary meetings are held at 5 St. Andrew Square, at 8 P. M., on the third Wednesday of each month. The annual meeting on the third Wednesday of November. The Club is limited to thirty members. Boardof Management: Convener, Dr. John Thomson, R.N. Secretary, J. C. H. Balmain, 13 Maitland street, Edinburgh.

Edinburgh Photographic Society.—Established 1861. Ordinary meetings are held on the first Wednesday of each month, except July, August and September, in the Professional Hall, 20 George street, at 8 p. m. The annual meeting is held in November. Patron, H.R.H. The Duke of Edinburgh. President, Hippolyte J. Blanc, F.S.A., Scotland. Seeretary, F. Barclay, 180 Dalkeith Road, Edinburgh.

ELIZABETHAN PHOTOGRAPHIC SOCIETY (BARNET).—Established 1887. Meetings in Queen Elizabeth's Grammar School. *President*, Rev. J. B. Lee, M.A. *Secretary*, J. Brittain, Eastcote Lodge, Richmond Road, New Barnet, Herts.

EXETER HALL CAMERA CLUB (in connection with the Central Y. M. C. A.).—Hon. Secretary, G. J. Ingram, Exeter Hall, Strand, London.

FALKIRK AMATEUR PHOTOGRAPHIC ASSOCIATION.—Hon. Secretary, John Waldo, Roberts Wynd, Falkirk.

FINSBURY TECHNICAL COLLEGE (PHOTOGRAPHIC SECTION).— President, Prof. R. Meldola, F.R.S. Hon. Secretary, L. W. de Grave, 1 Amberley Road, West Hill, Sydenham, S. E.

Forest Hill Scientific and Microscopical Society (Photographic Section).—Hon. Secretaries, S. C. Chapman, 307 Stanstead Road, Forest Hill, S. E., and M. E. Lownds, Stonehouse Lodge, London Road, Forest Hill, S. E.

FORMBY CAMERA CLUB.—President, R. E. Maclean. Hon. Secretary, S. R. Hunt, Grange Cottage, Formby, Lancashire.

Gateshead Institute Camera Club.—Hon. Secretary, G. R. Johnston, James street, Gateshead.

GLASGOW AND WEST OF SCOTLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1882. Rooms, 180 West Regent street, Glasgow. Ordinary meetings, third Tuesday of each month, October to April, at 7:30 p. m. Annual meeting in January. Informal meeting, every Tuesday throughout the year at 8 p. m. Dark room available for visitors. *President*, Ralph H. Elder. *Sceretaries*, William Goodwin, 3 Lynedoch street, and R. B. M. Stewart, 180 West Regent street, Glasgow.

Glasgow Photographic Association.—Established 1862. Meetings are held in Religious Institution Rooms, 177 Buchanan street, first Thursday in each month, at 8 p. m. *President*, William Lang, Jr., F.C.S. *Treasurer*, George Bell, 57 Argyle street, Glasgow. *Secretary*, J. Craig Annan, 153 Sauchiehall street, Glasgow.

GLOSSOP DALE PHOTOGRAPHIC SOCIETY.—President, Captain Partington. Hon. Secretary, J. K. Hollingberry, Norfolk Square, Glossop. Club Rooms, at Howard Chambers, Glossop.

GLOUCESTERSHIRE PHOTOGRAPHIC SOCIETY.—Reconstructed 1887. Meetings at Society's Rooms, Bank Buildings, Southgate street, Gloucester. Ordinary meetings, fourth Monday in the month, at 8 P. M. Annual meetings, in April. *President*, Walter

B. Wood. Vice-President, W. J. Jenkins. Committee, A. S. Helps, Dr. Hodges, A. H. Pitcher. Treasurer, Henry S. Crump. Secretary, Frank H. Burr, 8 Midland Road, Gloucester.

Graphic Society (Plymouth).—President, R. Murray. Hon. Secretary, J. S. Hawker, Mutley House, Plymouth.

HACKNEY PHOTOGRAPHIC SOCIETY.—Established 1889. Meetings, first and third Thursdays in each month at Morley Hall, Hackney. *President*, Dr. Gerard Smith. *Hon. Secretary*, W. Fenton Jones, 12 King Edward Road, Hackney.

Halifax Photographic Club.—Established 1881. Meets the last Thursday in each month in the Mechanics' Hall at 7:30 p. m. President, B. Rowley. Vice-Presidents, T. Illingworth and E. J. Smith. Council, B. B. Bingley, Major Holroyde, Henry Mossman, Councillor S. Smith, Joseph Whitely, together with the officers. Auditor, S. Goodman. Treasurer, E. H. Child. Hon. Secretary, W. Clement Williams, 13 Aked's Road, Halifax.

HALTWHISTLE PHOTOGRAPHIC SOCIETY.—President, Major Anne. Hon. Secretary, D. Macadam, Carlisle City and District Bank, Haltwhistle.

Hampstead Photographic Club.—Established 1887. Limited to twenty members. Meetings held at members' houses on the second and fourth Mondays in the month at 8:30 p. m. Affairs of the Club managed at meetings by members present. Treasurer, C. A. Watkins. Secretary, Bertram W. Wild, Gladesmore, Willesdem Lane, Brondesbury, N. W.

Hartlepool and District Amateur Photographic Society.—Established 1889. Ordinary meetings, second Tuesdays in the month. General annual meeting, second Tuesday in February, in the Society's Rooms, Mainsforth Terrace, West Hartlepool. President, Thomas Richardson, M.P. Vice-President, Christopher Furness, C.C. Council, John Livingstone, Councillor Garry, J. C. Winn, Rev. J. Patterson, A. Hardy, J. F. Hardy. Treasurer, W. N. Branson. Secretary, Charles J. Palmer, Solicitor, West Hartlepool.

HASTINGS AND ST. LEONARDS PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings are held on the second Monday in each month. *President*, Wilson Noble, M.P. *Hon. Secretary*, A. Brooker, Memorial Buildings, Hastings.

HEREFORDSHIRE AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings on the first Tuesday in each month from October to April at 7:30 P. M., at the Mansion House. Summer excursions on first Thursday in each month. Number of members, 48. President, James Rankin, M.P. Secretary, John Parker, Assis. M. Inst. C. E., Mansion House, Hereford.

Holborn Camera Club.—Established 1887. Headquarters, 100 High Holborn. Meet for discussion every Friday at 8 p. m., and for outings the first Saturday in each month from April to October. Annual general meeting, the first Friday in April.

President, W. Rice. Viee-Presidents, G. A. Freeman, B.Sc., F.G.S., and C. H. W. Biggs. Committee, H. Beckford, Thomas Oldacres Dear, F. W. Edwards, A. Nunn, A. J. Myers, J. E. Smith. Librarian, H. C. Gay. Treasurer, D. R. Lowe. Seeretary, Fred. Brocas, 100 High Holborn, W. C.

HOLMFIRTH AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1885. Meetings are held monthly on the first Tuesday of each month at 7:30 P. M., at the residence of each member in succession.

Hon. Seeretary, Thomas Brownson, Binn Villa, Holmfirth.

Huddersfield Photographic Society.—Meetings at Byram Buildings, Station street, on the first and third Wednesdays of each month, at 8 p. m. *President*, Surgeon-Major Foster. *Hon. Secretary*, H. M. Smith, 15 St. John's Road.

HULL AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1884. Meetings are held at the Royal Institution on the last Thursday in each month. *President*, C. F. Amos. *Vice-President*, C. D. Holmes. *Council*, Edward Bolton, J. P. Chatham, J. Stothard, W. B. Wilkinson, B. M. Stoakes, Charles O. F. Saner, A. T. Hall, George Shackles, D. W. Sissons, J. Walker. *Treasurer*, H. W. R. Smith. *Secretaries*, E. H. Howlett and A. N. Jameson, Royal Institution, Hull.

HYDE PHOTOGRAPHIC SOCIETY.—Established 1885. Annual meeting, third Wednesday in October. Meetings held on the third Wednesday in the month from September to April, inclusive, at 8 p. m. President, John Pennington. Viee-President, Dr. G. W. Sidebotham. Committee, Allen H. Hall, H. H. Clayton, Frank Bland, F. W. Cheetham, George F. Wild, Harry Hall. Auditors, George Robinson and Fred. Tinker. Treasurer, John Hall Brooks. Secretary, William H. Middleton, 146 Hyde Lane, Hyde.

IPSWICH PHOTOGRAPHIC SOCIETY.—Established 1888. Ordinary meetings on the second Wednesday in each month at 8 P. M., in the Art Gallery, High street, Ipswich, during October to April, inclusive. Excursions in Summer months are fixed by the Committee. Number of members, 52. President, J. Dixon Piper. Treasurer and Secretary, E. R. Pringle, 83 Berners street, Ipswich.

ISLE OF THANET PHOTOGRAPHIC SOCIETY.—Hon. Secretary, G. F. Blower, Memel Villa, West Cliff Road, Ramsgate.

Keighley and District Photographic Association.—Established 1889. President, Alex. Keighley. Secretary, Gill.

Kendal Literary and Scientific Institution (Photographic Section).—Established 1886. Meetings are held on the second Wednesday in each month at 7:30 p. m., in the Museum Library. Annual meeting in September. Field meetings during the Summer months at convenient times. Chairman, Isaac Braithwaite, Committee, F. Armstrong, S. R. Rowling, Chairman,

Treasurer, Secretary of Section, Secretary of Institution. *Treasurer*, Samuel Rhodes. *Secretary*, Charles E. Greenall, Prospect, Kendal.

LAMBETH POLYTECHNIC CAMERA CLUB.—Ferndale Road, Brixton. Treasurer, Rev. Freeman Wills, M. A. Hon. Secretary, Thomas I. Barthrop.

LANCASTER PHOTOGRAPHIC SOCIETY.—President, J. Parkinson. Hon. Secretary, W. Briggs, 21 Cheapside, Lancaster.

LEAMINGTON AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1887. Meetings on the first and third Fridays in the month, at 5:30 p. m., at the Trinity Church Room, Morton street. President, Surgeon-General Ranking. Committee, Surgeon-General Ranking, Rev. M. W. Gregory, Rev. H. G. Allfree, Rev. G. H. Shafto, H. Champion, J. Rhodes, F. M. Gowan. Treasurer and Secretary, F. M. Gowan, 20 Beauchamp Square.

LEEDS PHOTOGRAPHIC SOCIETY.—Founded 1852, re-established 1881. Ordinary meetings, first Thursday in the month; conversational evenings, third Monday in the month, at 7:30 p. m., at the Leeds Mechanics' Institute. Number of members, 110. President, Thomas W. Thornton. Treasurer, G. H. Rodwell, 44 Wade Lane, Leeds. Secretary, S. A. Warburton, 9 Banstead Terrace, Leeds.

LEEDS YOUNG MEN'S CHRISTIAN ASSOCIATION PHOTOGRAPHIC CLUB.—Established 1888. Meetings are held at the rooms of the Young Men's Christian Association, 13 South Parade, Leeds, on the Monday before the first Tuesday in each month at 8 P. M. Annual meeting, fourth Friday in March. President, Godfrey Bingley. Treasurer and Secretary, F. W. Fisher, 9 Meanwood Terrace, Meanwood Road, Leeds.

LEICESTER AND LEICESTERSHIRE PHOTOGRAPHIC SOCIETY.—Established 1885. Meets on the second Wednesday in each month from October to May in the Mayor's Parlor, Old Town Hall. Annual meeting, second Wednesday in January. Outdoor meetings, June, July, August and September. Number of members, 50. President, S. S. Partridge. Secretary, Henry Pickering, High Cross street, Leicester.

LEITH AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1888. Meetings held on the last Tuesday of every month at 8 P. M. Annual general meeting, last Tuesday of January. Number of members, 48. President, William Dougall. Treasurer, Alexander Pitkethly. Secretary, A. D. Guthrie, 7 Pitt street, Leith.

Lewes Photographic Society.—Established 1888. Ordinary meetings are held on the first Tuesday in each month at the George and Dragon Coffee Tavern, High street, at 8 P. M. Annue meeting, first Tuesday in September. President, J. G. Braden. Hon. Sepretary and Treasurer, E. J. Bedford, 10 St. John's Terrace, Lewes.

LEYTONSTONE PHOTOGRAPHIC SOCIETY. -- Established 1889,

Headquarters (with dark room), Fillebrook Lecture Hall, Fairlop Road, Leytonstone. Meetings (at present) on Wednesdays and Saturdays at 7:30 p.m. President, F. W. Cooper, L.R.C.S., L.S.A. Vice-President, Rev. J. Bradford. Treasurer and Secretary, Joseph W. Spurgeon, 1 Drayton Villas, Leytonstone, N.E.

LITERARY PHOTOGRAPHIC CLUB.—Established 1887. Founded for the circulation and exchange among the members of photographs of literary interest, or of places rendered celebrated by eminent persons. Number of members, 15. The Hon. Secretary would be glad to hear from any amateurs abroad (American or otherwise) willing to exchange photographs of other countries for an equivalent number of English photographs. Views of almost any English place specially wished for might be obtained in exchange on application to him. Hon. Secretary, R. A. R. Bennett, B.A., Walton Manor Lodge, Oxford.

LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1863. Ordinary meetings, last Thursday in each month except December. Annual meeting, last Thursday in November. Rooms open daily from 10 A. M. to 8 P. M. Developing room and enlarging camera. President, Paul Langé. Vice-Presidents, W. Tomkinson and W. D. Mead. Treasurer, Joseph Earp. Secretary, Walter Hughes, 3 Lord street, Liverpool.

LIVERPOOL UNIVERSITY COLLEGE PHOTOGRAPHIC SOCIETY.— President, Dr. C. A. Kohn. Hon. Secretary, Jas. L. Conroy, B. Sc., University College, Liverpool.

London and Provincial Photographic Association.—Established 1882. Meetings held at Mason's Hall Tavern, Mason's avenue, Basinghall street, E. C., every Thursday evening at 8 P. M. Trustees, J. Traill Taylor and J. B. B. Wellington. Committee, H. D. Atkinson, G. W. Atkins, J. J. Briginshaw, E. Clifton, W. E. Debenham, P. Everett, T. E. Freshwater, J. Moran. Curator, A. Haddon. Hon. Treasurer and Secretary, F. A. Bridge, East Lodge, Dalston Lane, London, N. E.

London Social Camera Club.—Established 1887. Headquarters Carr's Restaurant, 265 Strand. Primary object the combination of photography with cycling. *Hon. Scirctary*, Herbert Smith, 6 New Broad street, E. C.

LOUGHBOROUGH LITERARY AND SCIENTIFIC ASSOCIATION (PHOTOGRAPHIC SECTION).—Established 1888. *President*, J. B. Colgrove, M. A. *Hon. Secretary*, W. T. Tucker, Herrick Road, Loughborough.

LOUTH AND DISTRICT PHOTOGRAPHIC SOCIETY.—Hon. Sceretary, S. F. Clark, 8 Upgate, Louth.

LUTON AND DISTRICT PHOTOGRAPHIC SOCIETY.—President, Cyril Flower, M. P. Hon. Secretaries, Messrs. Geo. Bunyan and A. Howard

MAIDSTONE AMATEUR PHOTOGRAPHIC CLUB.—President, J. E. Austin. Hon. Secretary, Preston King, M. B., 9 London Road, Maidstone.

MANCHESTER AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1885. Annual meeting January. Ordinary meetings second Tuesday in each month, at the Manchester Athenæum. Number of members about 450. President, J. Davenport. Editor of Magazine (The Photographic Record), G. H. B. Wheeler. Treasurer, J. G. Jones. Secretary, R. O. Gilmore, Solicitor, 78 Cross street, Manchester.

MANCHESTER CAMERA CLUB.—Established 1883. Meetings held at the Victoria Hotel on the third Wednesdays at 7:30 P. M. Annual meeting in December. Secretary, J. Davenport, 4 John Dalton street, Manchester.

MANCHESTER PHOTOGRAPHIC SOCIETY. — Established 1855. Meetings second Thursday in each month throughout the year at 36 George street. Lantern section meetings, fourth Wednesday from September to March. *President*, Sir Henry E. Roscoe, M. P. *Hon. Secretary*, W. I. Chadwick, Brooklands, Manchester.

Montrose Photographic Association.—President, D. Ferrier, F. C. S. Secretary, F. Japp, 8 Union Place, Montrose.

Newcastle-on-Tyne and Northern Counties' Photographic Association.—Established 1882. Meetings of the Association are held in the Mosley Street Café, Newcastle-on-Tyne, at 7:30 P. M., on the second Tuesday in each month, except May, June, July, August and September. During the Summer months outdoor meetings are held. Number of members, 90. President, A. S. Stevenson, J. P. Secretary, Edgar G. Lee, 11 Beverley Terrace, Cullercoats, near Newcastle-on-Tyne.

Newcastle (Staffordshire) and District Amateur Photographic Society.—Established 1889. Meetings held every alternate Wednesday in Newcastle at 8 p. m. President, Colonel Dutton. Local Vice-Presidents, Thomas Stanway (Hanley), H. E. Whytehead (Stoke-on-Trent), W. E. Leek (Newcastle), Council, Wilberforce Beach, H. Broomfield, F. C. Carter, J. D. Illidge, S. Illidge, A. Stockton. Hon. Secretaries, W. W. Beach, West Brampton, Newcastle, Staffs., and J. D. Illidge, Earl street, Newcastle, Staffs.

NORFOLK AND NORWICH PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings, third Friday in the month at 8 p. m. President, F. W. Harmer. Vice-President, P. H. Emerson, B. A. Committee, B. Bullen, C. K. Crosskill, F. Spalding, G. Griffin. Treasurer, D. Howie. Secretary, Sparham Camp, Havelock Road, Norwich.

NORTH KENT AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1887. Ordinary meetings are held at Gravesend on the second Thursday in each month at 8 p. m. President, I. C. Johnson, J. P. Vice-President, E. J. Wall, A. P. S. Council, J. K. Barlow, E. C. Conrad, F. C. S., J. Stewart Dismorr, T. Nettlingham, S. R. Macartney, Cooper A. Rotherham, H. T. Wallis. Treasurer and Secretary, G. W. Cobham, 3 Edwin street, Gravesend.

NORTH LONDON PHOTOGRAPHIC SOCIETY.—Established 1885.

Ordinary meetings on the first and third Tuesday in every month at Myddelton Hall, Islington, N. Excursions on Saturday afternoons from Easter to Michaelmas. Annual meeting, first Tuesday in November. *President*, J. Traill Taylor. *Council*, Rev. E. Healy, W. Bishop, G. J. Clarke, J. Douglass, A. Mackie, L. Medland, J. Oakley, F. G. Reader, H. Walker, W. Few. *Curator*, W. T. Coventon. *Secretary*, G. J. Clarke, 52 Queens Road, Finsbury Park, London.

NORTH LONSDALE AMATEUR PHOTOGRAPHIC SOCIETY.—President, Rev. J. Gregson. Hon. Secretary, F. P. Heath, Ainsworth street, Ulverston.

NORTH MIDDLESEX PHOTOGRAPHIC CLUB.—Established 1888. Meetings in the Jubilee Hall, Hornsey Rise, N., on the second and fourth Mondays of each month, at 8:15 sharp. *President*, John Humphries, F. S. A. *Secretary*, George R. Martin, Harringay Granary, Green Lanes, Finsbury Park, London, N.

NORTH STAFFORDSHIRE NATURALISTS' FIELD CLUB AND ARCH-ÆOLOGICAL SOCIETY (PHOTOGRAPHIC SECTION).—President, H. E. Whytehead, Stoke-on-Trent.

NORTH SURREY PHOTOGRAPHIC SOCIETY.—Established 1888. Meets every alternate Tuesday at the West Norwood Constitutional Club, Norwood Road, S. E. Committee, W. H. Walker, L. Wolff, R. Crossthwaite, A. Rider, B. Wilkinson, G. R. Fludder. Hon. Sccretary, J. Larcombe, Cliftonville, Selsdon Road, West Norwood, London.

NORTHERN TASMANIAN CAMERA CLUB.—President, William Aikenhead. Secretary, F. Styant-Browne.

Nottinghamshire Amateur Photographic Association.—Established 1884. Club Rooms, Cavendish Chambers, 19 Market street, Nottingham. Meetings, alternate Mondays throughout the year. Lantern Meetings first Thursdays from October to April inclusive. Annual Meeting, first Monday in October. Excursious during the Summer months. Dark rooms, library. President, G. A. Bull. Vice-President, S. Wells and J. Furley Lewis. Council, R. S. Armitage, T. Carnell, Dr. W. T. Crew, Dr. Marriott, A. Pickard, T. S. Piggin, G. E. Smith, I. Spray, W. Towers, M. Tuquet, G. E. Williamson, H. A. A. Wigley. Hon. Treasurer, B. Sturges Dodd, 67 Beech avenue, Sherwood Rise. Hon. Secretary, P. E. Knight, 39 Burford Road, The Forest.

Notts Camera Club.—Hon. Secretary, H. Blandy, 1, Postern street, Nottingham.

OLDHAM PHOTOGRAPHIC SOCIETY.—Established 1867. All meetings are held at the Lyceum, Union street, Oldham. Monthly meetings on the last Thursday in each month, in the Club Room, at 7:45 P.M. Weekly meetings every Thursday evening, in the Society's Room from 8 to 10. The annual meeting is held on the last Thursday in October. Number of members 73. President, Thomas Heywood. Vice-President, Wallace Thomp-





son. Committee, John J. Bailey, James Brooks, Edward H. Dixon, Joseph S. Dronsfield, James Hall, J. H. Prestwich. Librarian, Moses Piper. Treasurer, John W. Whitehead. Hon. Secretary, Thomas Widdop, 16 Burnaby street, Oldham. Assistant Secretary, William A. Nash, 140 Greengate street, Oldham.

OXFORD PHOTOGRAPHIC SOCIETY.—Established 1889. Meetings held at the Wilberforce Hotel on the first and third Thursday in the month. *President*, Rev. Bedford Pim. *Vice-Presidents*, J. H. Salter, A. F. Kerry, Ryman Hall, C. C. Cole. *Committee*, W. Hurcombe Smith, E. T. Shelton, F. A. Bellamy, B. J. Franks, —Packford. *Treasurer*, Mr. Minn. *Secretary*, William Davis, 73 Banbury Road, Oxford.

OXFORD UNIVERSITY PHOTOGRAPHIC CLUB.—Established 1884. Meetings held at 8 o'clock every other Thursday or Friday during Term in the Club Rooms. President, G. S. Edwards, 16 Crick Road. Committee, E. W. H. Evers (Christ Church), A. A. Jackson (Magdalen), J. B. Allan (Oriel). Hon. Secretary, J. A. Theobald, Worcester College, Oxford.

OXFORDSHIRE NATURAL HISTORY SOCIETY, AND FIELD CLUB.—Established for the promotion of meetings and excursions for the discussion of Scientific matters, among the members. Meetings every alternate Tuesday in Term-time in the Geological Lecture Room; University Museum. In the Summer excursions are formed to various places of interest in the Vicinity. General Secretary, H. M. J. Underhill, 7 High street, Oxford. President of the Photographic Section, R.A.R., Bennett, B.A., Walton Manor Lodge, Oxford.

PAISLEY PHOTOGRAPHIC SOCIETY. — Re-established 1885. Monthly meetings at 8 P.M., in Paisley Museum, first Tuesday in each month from October till April inclusive. *President*, James Donald, jun. *Secretary*, Thomas Rastall, 4 Douglas Terrace.

PEOPLE'S PALACE PHOTOGRAPIC CLUB.—Established 1887. The Club meets on the first and third Fridays in the month in the new Technical Schools of the People's Palace. Persons eligible for membership are students of any subject either at the People's Palace or any other institution. Entrance fee 1s.; annual subscription, 2s. 6d. President, Sir Edmind Hay Currie. Vice-Presidents, E. Howard Farmer, C. W. Hastings, R. Mitchell. Committee, Alexander Albu, Robert Beckett, W. J. Downing, C. W. Gamble, John Hawkins, Thomas Lawday, H. Marriott. Treasurer and Secretary, William Barrett, 16 Clare Road, Forest Gate, E.

PERTHSHIRE SOCIETY OF NATURAL SCIENCE (PHOTOGRAPHIC SECTION).—President, W. Munro, B.A. Hon. Secretary, W. Ellison, 2 Dalhousie street, Perth.

PETERBOROUGH PHOTOGRAPHIC SOCIETY.—Established 1887. Annual meeting, first Monday in June. Ordinary meetings, first Monday in each month, at 8 P.M., at the Museum, Minster Pre-

cincts, number of members, 33. President, Dr. G. Kirkwood. Vice-Presidents, The Very Rev. the Dean, Rev. Canon Argles, Dr. T. J. Walker, J.P., Dr. J. M. Kennedy, J. H. Hetley, J. H. Pearson, E. Worthington. Committee, J. E. Saunders, A. C. Taylor, W. H. Marsh, J. F. Perkins, B. R. Ward. Treasurer, D. Gray. Secretary, A. W. Nicholls, 11 Cromwell Road, Peterborough.

Photographers' Benevolent Association.—Established 1873. Meetings as required. President, J. Traill Taylor. Hon. Solicitor, W. F. Benham. Trustees, Captain W. de W. Abney, and Treasurer, John Stuart, 112 New Bond street, W. Hon. Secretary, H. J. Beasley, 65 Chancery Lane, London, Hon. Local Secretaries—Bath: H. J. Walker, 8 Broad street. Brighton: F. Hambly, 69 Upper Lewes Road. Bristol: T. Protheroe. 35 and 36 Wine street. Derby: R. Keene, All Saints'. Edinburgh: H. W. Bibbs, 26 Myrtle Terrace, Slateford Road. Glasgow: J. Davie, 186 Sauchiehall street. Huddersfield: H. M. Smith, 20 John William street. Newcastle: J. B. Payne, Mosley street. Norwich: B. Howie, 85 St. Giles' street. Plymouth: J. E. L. Brokenshire, 48 Hotham Place, Millbridge, Devonport. Sheffield: T. S. Hicks, 141 Cemetery Road. bury: J. Pyefinch, Mardol Head. This Association has for its object the organization of the benevolence of Photographers, as a class, and thereby to afford temporary or permanent assistance to those members, their widows and children, being in necessitous circumstances arising from age, sickness, or misfortune, by granting annual pensions, and by giving immediate pecuniary grants in urgent cases to duly qualified applicants; and to aid the unemployed members in obtaining situations.

Photographic Convention of the United Kingdom.—Established 1886. President, C. H. Bothamley, Leeds. Council, W. Bedford, Bridge C. Beck, Cembrano, Cowan, Clifton, Dallmeyer, Dresser, Davison, S. H. Frey, Friese Greene, Haddon, Haes, H. M. Hastings, Levy, Mackie, Pringle, Samuels, Wellington, Webster. Hon. Secretary and Treasurer, J. J. Briginshaw, 128 Southwark street, London, S.E. Next meeting at Chester, in June, 1890.

Photographic Society of Great Britain.—Established 1853. The ordinary meetings are held at the Gallery of the Royal Society of Painters in Water Colors, 5a Pall Mall East, at 8 p. m., on the second Tuesday of each month from November to June inclusive. Annual general meeting on the second Tuesday in February. Extra meetings, called "technical meetings," are held on the fourth Tuesday in each month. Patrons, Her Majesty the Queen and H.R.H. the Prince of Wales. President, James Glaisher, F.R.S., F.R.A.S. Vice-Presidents, Captain W. de W. Abney, C.B., R.E., F.R.S., F.C.S., H. P. Robinson, John Spiller, F.C.S., F.I.C., T. Sebastian Davis. Council, G. L. Addenbrooke, W. Bedford, Valentine Blanchard, Lyonel Clark, Francis Cobb, Sir G. R. Prescott, Sir David Salomons, J. W. Swan, Alexander

Cowan, Thomas R. Dallmeyer, Major L. Darwin, G. Davison, W. E. Debenham, W. England, J. Gale, H. Chapman Jones, F.C.S., F.I.C., J. Traill Taylor, Leon Warnerke and H. Truman Wood. *Treasurer*, Walter S. Bird, 74 New Oxford street, W.C. *Hon. Secretary*, Captain A. M. Mantell, R.E., 8 Mansion Row, Old Brompton, Chatham. *Assistant Secretary*, Edwin Cocking, 5A Pall Mall East, S.W.

PHOTOGRAPHIC CLUB.—Established 1879. The meetings are held at Anderton's Hotel, Fleet street, London, E.C., every Wednesday evening, at 8 o'clock. Annual meeting, first Wednesday in November. *Hon. Secretary and Treasurer*, F. A. Bridge, East Lodge, Dalston Lane, London, N. E.

Photographic Society of Ireland.—Established 1879. Ordinary meetings, second Friday, technical meetings, fourth Thursday in each month from October to May inclusive, at 8 p. m. Annual meeting, second Friday in February, at 8 p. m., at the Society's rooms, 15 Dawson street, Dublin, in each case. Number of members, 136. President, George Mansfield, J.P. Secretary, J. H. Hargrave, B.A., 3 Newtownsmith, Kingston.

PHOTOGRAPHIC SOCIETY OF INDIA.—Headquarters, 29 Chowringhee Road, Calcutta. Hon. Secretaries, J. S. Gladstone and

A. Fleming, 8 Clive street, Calcutta.

PORTSMOUTH AMATEUR CAMERA CLUB.—Established 1888. Meetings are held in the Young Men's Christian Association Buildings, Edinburgh Road, Landport, on the first and third Wednesday in each month. Hon. Sccretary, G. Knight, 12 Middle street, Southsea.

Postal Photographic Society.—Established 1882. Committee meetings are held every three months, and the annual meeting in June, at the Vestry House. President, Dr. Horace Day. Secretary and Treasurer, E. Herbert Drake, The Vestry House, Lawrence, Pountney Hill, Cannon street, E.C. The above society has been founded as a postal society for the convenience of amateurs in different parts of the country, and with the following objects: For the circulation of prints, negatives, etc. For the exchange of photographs, and of information on photographic matters, and for the general advancement of the science and art of photography. Number of members, 60.

POSTAL PHOTOGRAPHIC CLUB.—Established 1886. Founded for the circulation, criticism, and exchange of prints taken by the members. The box containing the prints is forwarded monthly from member to member. Discussions, etc., are carried on in the note book accompanying the prints. Number of members, 21. Secretary, R. A. R. Bennett, Walton Manor Lodge, Oxford.

QUEENSLAND PHOTOGRAPHIC SOCIETY (AUSTRALIA.)—Established 1884. Hon. Secretary, C. M. Allen, Diocesan Registry, George street, Brisbane.

READING AMATEUR PHOTOGRAPHIC SOCIETY.--Established 1888. Ordinary meetings held on the second Wednesday in each month

at 7:30 P. M. Annual general meeting, last Wednesday in January in each year, at the Lecture Room, Science and Art Schools, Valpy street, Reading. *President*, W. Berkeley Monck. *Treasurer and Secretary*, J. Phillips, 10 Abbot's Walk, Reading.

REDCAR AND COATHAM AMATEUR PHOTOGRAPHIC ASSOCIATION.—Hon. Secretary, E. H. Saniter, 176 High street, Redcar.

ROSSENDALE PHOTOGRAPHIC ASSOCIATION.—Ordinary meetings held on the last Monday in each month at 8 p. M. Annual meeting, last Monday in September. President, Rev. H. W. Shrewsbury. Viee-Presidents, H. Henry and A. Kenyon. Council, Charles Lee, Joseph Ashworth, and the Officers. Financial Secretary, W. Chadwick. Secretary, F. W. Pilkington, 73 Bank street, Rawtenstall.

ROTHERHAM AMATEUR PHOTOGRAPHIC SOCIETY.—President, Dr. Baldwin. Hon. Secretary, W. Haywood Smith, 2 Lindum Road, Rotherham.

St. Bride's Mutual Photographic Society.—Established 1887, under the name of "The Teachers' Photographic Society." Meet for outings the first Saturday, and for discussions the third Wednesday in each month. Place of meeting varies. Annual general meeting for election of officers in April. President, W. Rice. Patrons, Captain W. de W. Abney, R.E., F.R.S., etc., and the Rev. A. Johnson, M.A., F.L.S. Conneil, J. Colman, A. Gill, D. R. Lowe, A. Nunn. Treasurer, G. A. Freeman, B.Sc., F.G.S. Secretary, Fred. Brocas, 86 Fleet street, E.C.

SCIENCE SCHOOLS (SOUTH KENSINGTON) PHOTOGRAPHIC SOCIETY.—President, Captain Abney. Hon. Secretary, P. C. Coultas, Normal School of Science, South Kensington, London.

Selby Photographic Society.—Established 1887. Meetings are held during the Winter months once a month, or oftener if necessary; and during the Summer months excursions as may be arranged. Present meeting place, St. James' Schools. Secretary and Treasurer, J. T. Atkinson, F.G.S., Hill Field House, Selby.

SHAFTSBURY PHOTOGRAPHIC SOCIAL.—Established 1888. Meetings held every Friday evening at 8:30, at the Craven Lecture Hall, Foubert's Place, Regent street, London, W. President, G. Davison. Vice-Presidents, A. Ibbetson and O. J. Holder. Committee, R. Aitken, G. A. E. Robinson, D. T. Rintoul, H. Miles, N. Baker, E. Bull. Treasurer, T. T. Samora. Hon. Secretary, John B. Rintoul, 36 Brewer street, Regent street, W.

SHEFFIELD CAMERA CLUB.—Established 1888. Number of members, 30. President, G. T. W. Newsholme, F.C.S. Hon. Secretary, G. E. Maleham, 2 Collegiate Crescent, Sheffield.

SHEFFIELD PHOTOGRAPHIC SOCIETY.—Established 1876. Meetings in the Masonic Hall, Surrey street, on the first Tuesday in each month, at 7:30 p. m. Annual meeting in October. *President*, B. J. Taylor. *Vice-Presidents*, G. Bromley and T. Firth,

Council, J. W. Charlesworth, A. Davy, A. Reynolds, W. T. Furness, Jonathan Taylor. Treasurer, Bradley Nowill. Secretary, Ernest Beck, Fairmont, Shoreham street, Sheffield.

SHROPSHIRE CAMERA CLUB.—Established 1886. Ordinary meetings, second Monday in each month. Annual general meeting in January at 9 The Square, Shrewsbury. President, E. Cresswell Peele. Vice-President, J. R. Greatorex. Council, W. Alltree, W. Bowdler, Dr. E. Cureton, W. Burson, E. Lloyd Oswell, J. Pyefinch, G. Bidlake, F. W. Williams. Treasurer, M. J. Harding. Secretary, Walter W. Naunton, 9 The Square, Shrewsbury.

SOUTHPORT PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings, December 16, 1889, and every fourth Monday afterwards. Annual meeting, March 10, 1890. President, Benjamin Booth-Vice-Presidents, W. Marsden and J. B. Walker. cil, B. Wyles, Dr. Hawksley, J. S. Dickin, D. G. Wilkinson, R. H. White. Treasurer, Holland J. Heaton. Secretaries, J. S. Dickin, 32 Hoghton street, Southport, and H. Hawksey, M. D., Roe Lane, Southport.

SOUTHSEA AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Ordinary meetings on the first Wednesday in each month and informal meetings on the third Wednesday at 9 P. M. general meeting, first Saturday in October, at 9 P. M. President, Captain T. Lamb. Vice-Presidents, Lieut. C. E. Gladstone, R.

N., and Captain T. Lamb, S. Lan. Regt. Council, Dr. J. L. Barrington, R. N., Lieut. F. W. Cobb, R. N., A. Fisher, A. S. A., C. H. Newby, F. R. C. S., Dr. D. Wardrop, A. M. D., S. W. Winter. Treasurer, J. J. Thornton. Secretary, F. Lord, L. R. C. P., Wilton House, Landport Terrace, Southsea.

SPEN VALLEY PHOTOGRAPHIC SOCIETY.—Hon. Secretary. Walter H. Wright, Cleckheaton.

STOCKTON PHOTOGRAPHIC SOCIETY.—Established 1886. Meetings, second Tuesday in every month at 8 P. M., in the society's rooms, Exchange Buildings. No. of members, 54. President, W. W. Stainthorpe, M. D. Secretary, Frank Appleby, 2 Rosslyn Terrace.

SUN & COMPANY.—Established 1887. A postal photographic society for the monthly circulation and criticism of photographs, entirely the work of members, and for a general interchange of ideas with a view to mutual advancement in the science and art of photography. Application as to vacancies for membership should be sent, with stamp for reply, to the Hon. Secretary, Martin J. Harding, 6 College Hill, Shrewsbury.

SUNDERLAND PHOTOGRAPHIC ASSOCIATION.—Established 1888. President, J. W. Mounsey. Vice-President, A. Stafford. cil. R. M. Cleatt, C. E. Cowper, H. Jackson, W. Pinkney, W. Pratt, Jr., H. Ridgeway. Treasurer, Thomas Walton. tary, H. H. Pinkney, 55 John street, Sunderland.

SURBITON AMATEUR PHOTOGRAPHIC SOCIETY.-Established

1888. No fixed date for meetings. President, W. M. Robertson. Vice-President, W. Whitfield. Committee, F. J. Barclay, A. D. Doughty, E. H. Hancock, A. E. Lane, C. Simpson. Treasurer and Secretary, A. E. Lane, "The Ferns," King Charles Road, Surbiton.

SUTTON (SCIENTIFIC SOCIETY) PHOTOGRAPHIC CLUB.—Established 1886. Meetings on the first Tuesday in the month at the Sutton Scientific Society, 1 Grove Road, Sutton. Surrey. Chairman, A. Wormald. Recorder, Miss E. Culverhouse, The Hundred Acres, Sutton, Surrey.

SWANSEA AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1888. Ordinary meetings held on the last Friday in each month. Annual meeting in October. President, B. H. Morgan. Viee-Presidents, W. E. Brown and C. W. Slater. Treasurer, H. Hoskins. Secretary, E. Ernest Morgan, Bryn-Nant, Hafod, Swansea.

Tasmania Photographic and Art Association.—Established 1887. President, Kussell Young. Secretary, Nathaniel Oldham, Claremont, Hobart.

Tunbridge Wells Amateur Photographic Association.— Patron, Sir David Salomons, Bart. President, F. G. Smart. Vice-Presidents, J. G. Calway, Rev. A. T. Scott, Rev. J. E. Rogers. Committee, J. W. Morgan and A. W. Pierson. Hon. Treasurer, B. Whitrow. Hon. Secretary, Joseph Chamberlain, 14 Calverley Park Gardens, Tunbridge Wells.

ULSTER AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1885h Meetings at the Belfast Museum on the second Monday of eact, month from October till April, inclusive, at 7:30 P. M. Presidens, Professor Letts, Ph. D., F. R. S. E., F. G. S. Vice-Presidents, William Swanston, F. G. S., and Alexander Tate, C. E. Secretary, Cecil E. Shaw, M. D., 14 College Square East, Belfast.

University College Photographic Society.—Established 1889. Ordinary meetings, alternate Tuesdays during the session at 5 p. m. Annual meeting, first fortnight in June, at University College. *President*, Dr. R. T. Plympton. *Secretary*, J. T. Leon, B. Sc., University College, London, W. C.

UTTOXETER PHOTOGRAPHIC SOCIETY.—Hon. Secretary, A. Parker, High street, Uttoxeter, Staffordshire.

VICTORIA CAMERA CLUB (AUSTRALIA).—Hon. Sceretary, C. F. Burrows, 5 Queen street, Melbourne.

WALLASEY PHOTOGRAPHIC ASSOCIATION.—Established 1886. Ordinary meetings, first Wednesday in each month at 8 p. m. at the Institute, Egremont. Annual meeting, November. *President*, Colonel E. T. D. Cotton, M. P. Seeretary, G. Breading, Church street, Egremont, Cheshire.

Walton Photographic Society.—Established 1889. Meetings, first Thursday in each month in Arnot Street Schools, County Road, Walton, Liverpool. *President*, Henry E. Burn.

Vice-President, H. E. Burn. Council, Messrs. Park, Tyerman, Beaton, Davis, Mackrell. Treasurer and Secretary, John Kennedy, 65 Carisbrooke Road, Walton, Liverpool.

Warrington Amateur Photographic Society.—Established 1886. Ordinary meetings, last Tuesday in each month at 8 p. m. Annual meeting, last Tuesday in January, at the Museum, Bold street. President, Thomas J. Down. Vice-Presidents, H. N. Houghton and H. E. Lees. Council, James Harding, J. T. Jones, E. Wallington, J. Fairhurst. Librarian, W. H. Woodcock. Treasurer, Peter Dalton. Secretary, Rev. J. A. Drummond, B. A., Stockton Heath, Cheshire.

Wellington Amateur Photographic Society.—Secretary, W. Williams, Wellington, New Zealand.

West Kent Amateur Photographic Society.—President, Andrew Pringle. Vice-President, A. R. Dresser. Council, Edward E. Jones, R. Gilbert, E. T. Edwards, Edward Hawkins. Hon. Treasurer, J. Bampfylde. Hon. Secretary, Edward G. Adams, Holmleigh, Bexley, S. E.

West London Photographic Society.—Established 1888. Meetings on the second and fourth Friday in each month at the Addison Hall, Addison Road, W. President, Charles Bilton, B. A. Vice-Presidents, G. F. Blackmore, E. W. Foxlee, Walter Colls, F. H. Low. Council, J. D. England, T. S. Hazeon, J. Hyatt, T. B. March, Harold Power, C. G. Richardson, Wyndham Rickford, Charles Whiting, Charles Winter, G. E. Varden. Treasurer, Lionel Charles Bennett. Secretary, John Alfred Hodges, 87 Chancery Lane.

West Surrey Amateur Photographic Society.—Established 1888. Monthly meetings at the Lecture Hall (next the Chapel), Mallinson Road, Wandsworth Common. *President*, J. Gale. *Vice-Presidents*, G. Davison, W. Winsford, J. L. Lyell. *Committee*, A. S. Roberts, G. Hellyer, P. Martin, J. H. Smith, A. Robertson, A. Borley. *Treasurer and Secretary*, John Watkinson, 42 Honeywell Road, Wandsworth Common.

WINDSOR AND ETON PHOTOGRAPHIC SOCIETY.—Hon. Secretary, W. Oldham, 100 Eton.

WOLVERHAMPTON AMATEUR PHOTOGRAPHIC SOCIETY.—President, T. Ironmonger. Hon. Secretary, T. W. Evans, 52 Darlington street, Wolverhampton.

Worcestershire Camera Club.—Established 1888. Ordinary meetings on the first Tuesdays in the month from October to April, at 7:30 p. m., in the Kidderminster School of Science. Annual meeting, last Tuesday in January. President, Michael Tomkinson. Vice-Presidents, Arthur Comber and Albert Cowell. Council, Miss E. Cowell, C. J. Carter, G. W. Grosvenor, B. Hepworth, J. S. Hussey, Horatio Smith, C. Walker. Exhibition Committee, Miss C. Badland, W. C. Awdry, F. G. Jones (Worcester), R. Varney, G. Weston. Treasurer, Harvey Preen. Secretary, William Ray, F. C, S., F. I. C., School of Science, Kidderminster.

Wylde Green Camera Club.—Meetings held at the Town Hall, Sutton Coldfield, on the first Monday in every month. President, J. B. Stone, J. P., F. R. G. S., F. G. S., etc. Committee, H. Bilson and A. H. Plante. Hon. Treasurer, William Betts. Hon. Secretary, William M. Sadler, Jr., Melrose House, Wylde Green, near Birmingham.

YORK PHOTOGRAPHIC SOCIETY.—Established 1887. Meetings, first Tuesday in each month at 19 High Ousegate. President, F. Vincent. Vice-President, T. Campbell Maccormac. Council, G. Pawson, A. Hick, A. J. T. Ogden, G. Tittensor. Treasurer, R. Bainbridge. Secretary, Frederic G. Benson, 18 Russell street, Scarcroft Road, York.

Yorkshire College Photographic Club.—Established 1883. The meetings are held in the College Buildings in each month throughout the session. During the Summer months excursions will be made to places of interest. Annual meeting in June. President, C. H. Bothamley, F.I.C. Treasurer and Secretary, Harry B. Hall, 20 Regent Terrace, Edwin Roads, Leeds.

Yorkshire Philosophical Society (Photographic Section).—Established 1888. Meetings at the Museum, York, on the first Wednesday in every month, at 8 p. m. President, Tempest Anderson, M.D., B.Sc., etc. Vice-Presidents, Dr. Hingston and W. Monkhouse. Committee, G. Cussons, M. Spence, T. N. Kitching, R. Marchant. Treasurer and Secretary, Henry R. Moiser, F.G.S., etc., Heworth Grange, York.

CONTINENTAL PHOTOGRAPHIC SOCIETIES.

ASSOCIATION BELGE DE PHOTOGRAPHIE.—Established 1874. President, T. Macs, 10 Rue Gramaye, Antwerpen, Vice-Presidents, Alex. de Blochouse and Massange de Louvrex. Committee, E. Candèze, Colard, Herry, Géruzet, Lunden, Puttemans, Rutot, Sell and Storms. Treasurer, Capitaine L. Massaux, 22 Chaussée de Fleurogate, Brussels. Secretary, O. Campo, 12 Rue Sans-Souci, Brussels.

Dansk Fotografisk Forening.—Established 1879. President, J. Petersen. Vice-President, Chr. Neuhaus. Committee, P. Steenbro, Johannes Petersen and Chr. Christensen. Secretary, P. Steenbro, 21 Bredgade, Kopenhague. Ordinary meet-

ings, the last Monday in every month at Copenhagen.

DEUTSCHE GESELLSCHAFT VON FREUNDEN DER PHOTOGRAPHIE IN BERLIN.—Established 1887. President, Professor Dr. H. W. Vogel. Vice-President, Oberstlieutenant Hedinger. Committee, Oberstlieutenant Hedinger, Professor Jacobsthal, Landschaftsmaler Koerner, Ingenieur Kirchner, Dr. Phil. Lummer, Captain zur See Mensing, Maler Milster, Oberst Tetzlaff, Geheim. Sanit. Rat. Professor Dr. Tobold, Photochemiker Schultz-Hencke, Kammersänger Standigl, Professor Dr. Rietschel, Professor Dr. H. W. Vogel and Dr. Zenker. Treasurer, Maler E. Milster. Secretary, Dr. W. Zenker, W. Motz Str. 74.

DEUTSCHER PHOTOGRAPHEN VEREIN.—Established 29 December, 1876. President, K. Schwier, Weimar. Vice-President, Fr. Müller, München, Amalienstr. 9. C. Kindermann, (Fr. Benque & Kindermann), Hamburg, gr. Bleistrasse, 30, and Gg. Brokesch, Leipzig, Zeitgerstr. 2, the Beisitzer. Treasurer, Karl F. Wunder, Hannover, Friedrichstr. 8a. Secretary, F. Tellgmann, Mühlhausen in Thüringen. Corresponding Secretary, K. Schwier, Weimar. Jährlich 1 Wanderversammlung; für 1889, August, in Lübeck.

Internationaler Photographen Verein 'Victoria.'--Established 1882. President, H. Dieterich, Guben. Vice-President, A. Schulz, Königswalde. Committee, Th. Weiss, Guben, E. Berger, Grünberg, R. Ochs, Frankfort-on-Oder, H. Wegener, Freienwalde. Treasurer and Secretary, Carl Grall, Guben.

MÜNCHENER PHOTOGRAPHISCHE GESELLSCHAFT.—Established 1879. President, Franz Werner. Treasurer, Otto Perutz. Secretary, Paul Zschokke, Landwehrstrasse, 31, München.

Photographische Gesellschaft, Hamburg, Altona.—Established November 4th, 1873. President, G. Wolf, Hamburg. Vice-President, Th. Petersen, St. Pauli. Committee, Herm-Boock, C. W. Lüders, Kunstschleifer. Treasurer, W. Köhnen,

AMERICAN AND WESTERN PHÓTOGRAPHIC SOCIETIES.

ADRIAN CAMERA CLUB (Adrian, Mich.)—Organized February 17th, 1890. President, Frederick B. Stebbins. Viee-President, William Barnum. Secretary and Treasurer, W. H. Carrier. Meetings, every Monday at 8 P.M.

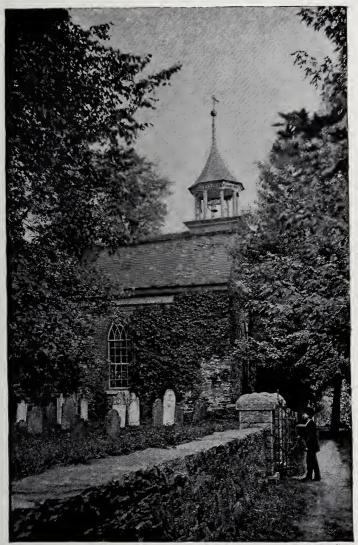
AGASSIZ ASSOCIATION, MANHATTAN CHAPTER, N.Y.B., (N. Y.)—Organized May, 1881. President, William T. Demarest. Treasurer, William S. Miller. Corresponding Secretary, Edward B. Miller, 141 East 40th street. Place of meetings announced. Date of meetings, first Friday after first Monday each month.

Albany Camera Club (Albany, N. Y.)—Organized October 21st, 1887. President, W. W. Byington. Treasurer, Charles L. Palmer. Secretary, Charles L. Palmer. Place of meeting, 20 North Pearl street. Date of meeting, first Friday in each month 8 p.M.

AMERICA. PHOTOGRAPHERS ASSOCIATION OF.—Organized 1879. President, J. M. Appleton. Treasurer, G. M. Carlisle, M.D. Seeretary, D. R. Coover, Iowa City, Iowa. Place of meeting, Washington, D. C. Date of meeting, August 12th to 15th inclusive, 1890.

AMERICAN INSTITUTE, N. Y. (PHOTOGRAPHIC SECTION).—Organized March 26th, 1859. President, Henry J. Newton. Treasurer, Edward Schell. Secretary, Oscar G. Mason, Photographic Department Bellevue Hospital, New York. Place of meeting, Institute Hall, 115 West 38th street, New York. Date of meeting, first Tuesday in each month, except July and August, at 8 o'clock.

American Lantern Slide Interchange (Cincinnati, O.)—Manager, George Bullock, Oak avenue, Cincinnati O. Assistant Managers, F. C. Beach, 361 Broadway, New York, W. H. Rau, 1324 Chestnut street, Philadelphia, Pa. The members of the Interchange are the Society of Amateur Photographers of New York, represented by F. C. Beach. Philadelphia Photographic Society, by W. H. Rau. The Pittsburgh Amateur Photographers' Society, by W. S. Bell. The Cincinnati Camera Club, by George Bullock. The St. Louis Camera Club, by H. B. Alexander. The Chicago Lantern Slide Club, by W. A. Morse. The Louisville Camera Club, by C. R. Peaslee. The New Orleans Camera Club, Frank Carpenter. The Newark Camera Club, by C. G. Hine. The Syracuse Camera Club, by Wallace Dickson. The Amateur Photographic Society of Baltimore, by A. S. Murray. From December 1st to June 20th of each year, exchanges of lantern slides are made monthly between each association, and annually with the Camera Club of England.



Negative by E. D. Gardner.

Lewis Eng. Co.



AMHERST COLLEGE (Mass.) CAMERA CLUB.—President, R. B. Luddington. Secretary, H. N. Potter.

ATLANTA CAMERA CLUB (Atlanta, Ga.)—Organized October 1st, 1888. President, F. J. Paxon. Treasurer, Dr. O. F. Stockton. Secretary, J. H. Sharp, 66½ Whitehall street. Place of meeting, 66½ Whitehall street. Date of meeting, 2d Monday of each month.

Baltimore (Md.), Amateur Photographic Society of.—Organized April 3d, 1885. President, Isaac T. Norris. Treasurer, Randall McKein. Secretary, Harry D. Williar. P. O. Box 344 Baltimore, Md., or 9 and 11 East Camden street. Place of meeting, 106 North Charles street. Date of meeting, third Friday in each month.

Boston Camera Club (Mass.)—Organized 1882. President, Henry N. Sweet. Treasurer, F. Alcott Pratt. Secretary, Edward F. Wilder, 47 Tremont street, Boston, Mass. Place of meeting, Club Room, 50 Bromfield street. Date of meeting, 1st Monday in each month, except June, July, August.

BRIDGETON (N. J.), CAMERA SOCIETY OF.—Organized January, 1890. President, Henry A. Janvier. Viee-President, Fred. F. Smith. Treasurer, George Hampton. Secretary, Hugh L. Reeves. Place of meetings, 48 Commerce street. Date of meetings, first Tuesday of each month.

BROOKLYN ACADEMY OF PHOTOGRAPHY.—Incorporated February, 1887. President, Frank La. Manna. Vice-Presidents, W. T. Wintringham, William Arnold, John Merritt, M. D. Edgar, J. Taylor, James L. Cornell, M.D. Corresponding Secretary, Harry S. Fowler. Recording Secretary, Hermance Tremper. Treasurer, Edward H. Quantin. Curator and Librarian, George S. Wheeler. Place of meeting, Hoagland Laboratory, Henry street, corner Pacific. Date of meeting, 2d Wednesday of month.

BROOKLYN INSTITUTE (N. Y.), Department of Photography.—Organized 1888. President, Alexander Black. Viee-President, H. D. Eggleston. Treasurer, W. C. Bryant. Secretary, Gould W. Hart, 1028 Gates avenue. Curator, Dr. L. E. Meeker. Place of meeting, Brooklyn Institute, 200 Washington street. Date of meeting, 2d Tuesday in each month; social meeting every Friday eve.

BROOKLYN (N. Y.), PHOTOGRAPHIC ASSOCIATION OF.—President, Charles Wapler. Treasurer, J. A. Gafney. Secretary, Charles M. Heid, 54 Stone street, New York. Place of meeting, Arion Hall, Wall street and Broadway. Date of meeting, first and third Wednesdays of each month.

BROOKLYN (N. Y.) SOCIETY OF AMATEUR PHOTOGRAPHERS.— Organized March 22d, 1889. President, C. M. Trowbridge. Viee-President, H. Ladd. Treasurer, E. D. Litchfield. Secretary, H. P. Sewall, 65 Pineapple street. Place of meeting, Rooms of Society, 412 Jay street corner of Fulton. Date of meeting, 1st Thursday in every month.

BUFFALO CAMERA CLUB.—Organized October 10th, 1888. President, Dr. G. F. Hunter Bartlett. Vice-President, Charles W. Hamlin. Treasurer, Charles E. Hayes. Corresponding Secretary, E. F. Hall, 306 Main street. Place of meeting, Buffalo Library. Date of meeting, first Friday of each month.

California Camera Club.—Organized March 18th, 1890. President, G. W. Reed. 1st Vice-President, Sanford Robinson. 2d Vice-President, A. P. Flagler. Secretary, T. P. Andrews. Corresponding Secretary, W. N. McCarthy, 525 Ofarrell street, San Francisco, Cal.

CANADA. PHOTOGRAPHIC ASSOCIATION OF.—President, S. J. Dickson, Toronto. Secretary and Treasurer, E. Poole, St. Catherines, Ontario. Date of meetings, August. Place of meetings, Toronto.

Case School Camera Club (Cleveland, Ohio.)—Organized December, 1888. Hon.-President, Dr. C. F. Mabery. Hon. Vice-President, Prof. A. W. Smith. President, William T. Rynard. Vice-President, George D. Marshall. Secretary and Treasurer, Edward H. Williams. Corresponding Secretary, Milton B. Punnett. Place of meeting, Case School of Applied Science.

CHICAGO CAMERA CLUB (Ill.)—President, Rev. M. L. Williston. First Vice-President, William H. Shuey. Second Vice-President, Mrs. A. C. McClurg. Treasurer, John W. Buehler. Secretary, Frederick K. Morrill. Place of meeting, 182 Wabash avenue.

CHICAGO LANTERN SLIDE CLUB.—President, Col. A. F. Stevenson. Treasurer, E. J. Wagner. Secretary, W. A. Morse, 20 Kemper place. Place of meeting, Stewart Building, State and Washington streets. Date of meeting, third Thursday each month.

Chicago (III.) Photographic Society of.—President, Judge James B. Bradwell. Treasurer, G. A. Douglas. Secretary, C. Gentile. Place of meeting, Art Institute. Date of meeting, first Wednesday of each month.

CHINA CAMERA CLUB.—Organized 1888. President, Dr. Milles. Vice-President, Dr. Perkins. Treasurer, W. S. Ewens. Secretary, W. G. Gibson. Meetings once a month, September to May inclusive.

CINCINNATI (Ohio) CAMERA CLUB.—Organized January 24, 1884. President, George Bullock. Viec-President, W. Hubbell Fisher. Treasurer, Aaron Prince. Sceretary, Emery H. Barton. Corresponding Secretary, H. C. Fithian, 108 Broadway. Date of meeting, first and third Mondays of each month.

CLEVELAND (Ohio) CAMERA CLUB.—Organized January 25, 1887. President, Montague Rogers. Vice-President, Frank

Dorn. Treasurer, Will Dorn. Corresponding Secretary, R. Dayton, M. D. Recording Secretary, Al. Ogier. Place of meeting, 5 Euclid avenue. Date of meeting, first and third Tuesday evenings.

COLUMBIA COLLEGE (N. Y.) AMATEUR PHOTOGRAPHIC SOCIETY.—Organized 1886. President, Julian T. Davis, Jr. Treasurer, Henry R. Taylor. Secretary, Dwight W. Taylor, 500 Madison avenue, city. Place of meeting, Columbia College. Date of meeting, twice a month.

Columbian College (Washington, D. C.) Camera Club.—Organized 1888. President, Allan J. Houghton. Vice-President, Edwin W. Ashford. Treasurer, A. J. Houghton. Librarian, W. B. Asmussen. Secretary, Charles P. Spooner. Place of meeting, Columbian College, Washington, D. C. Ordinary meetings, every Wednesday afternoon.

COLUMBUS (Ohio) CAMERA CLUB. Organized October 6, 1884. President, Frank Henry Howe. Treasurer, Jos. C. Hull. Secretary, George Y. Anderson. Place of meeting, Room 10, Dunn Building, Date of meeting, third Thursday of each month.

Cornell (Ithaca, N. Y.) Camera Club.—Organized in 1888. President, E. M. Charnot. Viee-President, C. B. Brun. Treasurer, S. J. Larned. Secretary, John F. Skinner. *Place of meeting, Ithaca, N. Y. Date of meeting, by notice.

CRANFORD (N. J.) CAMERA CLUB.—Organized September 13, 1888. President, William Chamberlain. Treasurer, J. M. P. Joseph. Secretary, A. H. Plummer, Cranford, N. J. Place of meeting, Club Room. Date of meeting, every Saturday evening.

Detroit (Mich.) Amateur Photographic Society.—Organized ——. President, James Joy. Treasurer, D. Farrand Henry. Secretary, Joseph E. Lockwood. Place of meeting, 42 State street, Society Rooms. Date of meeting, regular monthly, second Monday in each month.

FRANKFORD (Philadelphia) CAMERA CLUB.—Organized February, 1890. President, George M. Taylor. Vice-President, Bernard H. Smith. Treasurer, J. Howard Horrocks. Secretary, John M. Justice, Orthodox and Leiper streets. Place of meeting, Wright's Institute, Frankford, Phila.

German Photographic Society of New York.—Organized 1868. President, A. Mildenberger. Viee-President, H. Fruwirth. Treasurer, G. E. Pellnitz. Financial Secretary, L. Schill. Corresponding Secretary, H. G. Borgfeldt, 192 Washington street, Hoboken, N. J. Place of meeting, No. 62 East Fourth street, New York City. Ordinary meetings, second and fourth Wednesday of every month at 8:15 o'clock, P. M.

Grand Rapids (Mich.) Photographic Society.—Organized——. President, Dr. J. C. Parker. Treasurer, Ralph Tietson. Secretary, J. B. Barlow. Place of meeting, 15 Fountain street. Date of meeting, first and third Monday in month.

Hartford (Conn.) Camera Club. Organized February 18, President, Dr. George L. Parmele. Corresponding Secretary and Treasurer, E. H. Crowell, P. O. Box 480. Recording Secretary, Charles R. Nason. Regular meetings, second Tuesday in the month. Place of meeting, Room 68, Æina Life Insurance Building.

HAWAIIAN (HONOLULU, SANDWICH ISLANDS) CAMERA CLUB.— President, C, Hedeman. Secretary, A. W. Richardson, Campbell's Block, corner Front and Merchants streets, Honolulu, S. I.

Hoboken (N. J.) Camera Club.—Organized March 22d, 1889. President, A. J. Thomas. Treasurer, C. L. A. Beckers. Secretary, Geo. H. Steljes, 306 Washington street, Hoboken, N. J. Place of meeting, Rooms 140 Washington street. Date of meeting, first and third Tuesday of each month.

Indianapolis (Ind.) Camera Club.—Organized November 18th, 1887. President, John McBride. Treasurer and Secretary, Carl H. Lieber, 33 South Meridian street. Place of meetings

Date of meeting, first Tuesday in month.

Jamestown (N. Y.) Camera Club.—President, Williams Bailey. Vice-President, S. Winsor Baker. Treasurer, Lewis B. Kent. Secretary, Clifton B. Gates.

Japan. Photographic Society of.—Organized June, 1889. President, Viscount Enomoto, Minister of Education for Japan. Vice-Presidents, Prof. D. Kikuchi, M. A. Cantab, Dr. W. S. Bigelow. Secretaries, Prof. H. Ishikaua, Prof. W. K. Burton. Treasurer, T. Asanuma.

Jersey City (N. J.) Camera Club,—Organized May, 1889. President, Emile W. Granert. Viee-President, Dr. J. P. Levering. Secretary, E. D. Bellows. Treasurer, Hugo L. Steidel. Date of meeting, every Thursday. Place of meeting, 4 Oakland avenue.

Kansas City Camera Club.—Organized March, 1890. President, G. W. Pearson. Vice-President, W. W. Cloon. Secretary, Charles A. Young. Treasurer, W. H. Perine. Executive Committee, George W. Curtis, Theodore Stanley, E. H. Allcutt. Meetings, third Saturday of each month.

LOUISVILLE (Ky.) CAMERA CLUB.—President, C. R. Peaslee. Vice-President, Alex. Griswold. Treasurer and Sceretary, R. L. Stevens, 1100 West Main street. Place of meeting, northeast corner 4th and Jefferson streets. Date of meeting, second and fourth Thursday of each month; annual, first meeting in February.

Lowell (Mass.) Camera Club.—Organized January, 1889. President, William P. Atwood. Treasurer, Henry W. Barnes. Secretary, George A. Nelson, 81 Appleton street. Place of meeting, Central Block. Date of meeting, third Tuesday November to March inclusive.

Lynn (Mass.) Camera Club.—Organized January 3d, 1888.

President, William H. Drew. Viee-President, Joseph N. Smith. Treasurer, E. F. Bacheller. Recording Secretary, J. W. Gibboney. Corresponding Secretary, W. A. Porter. Place of meeting, Club House, 42 Broad street. Date of meeting, first Tuesday of each month.

Marlboro (Mass.) Camera Club.—President, H. C. Russell. Treasurer, Dr. O. H. Stevens. Secretary, George L. Stevens. Place of meeting, members' houses in rotation. Date of meeting, first Tuesday evening in each month.

MILLBURY (Mass.) CAMERA CLUB.—President, T. D. Bristol, M.D. Treasurer, T. A. Bottomly. Secretary, T. A. Bottomly. Place of meeting, Rooms of Millbury Natural History Society. Date of meeting, first Monday evening in each month.

MILWAUKEE (Wis.) CAMERA CLUB.—Organized October 13th, 1889. President, Thomas H. Spence. Treasurer, H. C. Tilton. Secretary, H. C. Tilton. Place of meeting, Club Rooms, 115 Wisconsin street, Room 21. Date of meeting, every other Wednesday.

MINNEAPOLIS (Minn.) CAMERA CLUB.—President, R. D. Cleveland. Treasurer, George M. Wilson. Secretary, C. A. Hoffman, 22 South Fourth street. Place of meeting, 20 South Fourth street. Date of meeting, every second and fourth Tuesday of month.

Mobile (Ala.) Camera Club.—Organized April, 1890. President, H. Pillans. Secretary and Treasurer, Lyman Dorgan, Jr. Place of meeting, north side of St. Francis, Second West of St. Joseph street.

Montreal (Can.) Camera Club.—Organized January, 1890. President, Alex. Henderson. Vice-President. J. B. Abbott. Treasurer, W. J. White. Hon. Secretary, Charles F. Dawson, 233 St. James street. Place of meeting, Rooms of the Natural History Society. Date of meetings, third Tuesday in each month.

Mystic Camera Club (Medford, Mass.)—Organized June 4th, 1889. President, George E. Davenport. Vice-President, A. F. Boardman. Secretary and Treasurer, George L. Stone, 1 Asland Place, Medford, Mass. Meetings, first Tuesday in each month.

NEWARK (N. J.) CAMERA CLUB.—Organized April 17th, 1888. President, William A. Halsey. Vice-President, Charles Leroy. Treasurer, J. M. Foote. Secretary, C. G. Hine. Place of meeting, 828 Broad street. Date of meeting, second and fourth Mondays of each month.

New Brunswick (N. J.) Camerads.—Organized 1889. President, Prof. P. T. Austen. Vice-President, W. Horn. Secretary and Treasurer, Dr. Harvey Iredell.

NEW ORLEANS (La.) CAMERA CLUB.—Organized December 16th, 1886. President, Harry T. Howard. Vice-President, Joseph A.

Hicks. Treasurer, P. E. Carriere. Secretary, R. S. Charles, Jr., Cotton Exchange Building. Place of meeting, 3 Carondelet street. Date of meeting, first Wednesday of each month.

New York (N. Y.) Camera Club.—Organized March, 1889. President, David Williams. Treasurer, Dr. Robert J. Devlin. Secretary, H. T. Duffield. Executive Committee, Dr. H. G. Piffard, W. Townsend Colbron, W. J. Cassard. Trustees, Dr. E. P. Fowler, Thomas Manning, H. J. Hardenburgh, C. Volney King, Franklin Harper. Place of meeting, 314 Fifth avenue. Date of meetings, Monday evenings.

NEW YORK (N. Y.), SOCIETY OF AMATEUR PHOTOGRAPHERS OF. Organized March 28th, 1884. President, James H. Stebbins, Jr. Vice-President, A. L. Simpson. Corresponding Secretary, F. C. Beach. Recording Secretary, T. J. Burton. Treasurer, C. C. Roumage. Place of meeting, 12 West 31st street. Date of meeting, second Tuesday in month.

NIAGARA CAMERA CLUB, LOCKPORT, N. Y.—Organized December 30th, 1889. President, Rev. J. W. Sanborn. Vice-President, Wm. H. Case. Treasurer, Charles N. Van Valkenburg. Secretary, G. Lewis Holmes, 174 Genesee street. Outing Captain, Mr. A. L. Davison.

OLD COLONY (Rockland, Mass.) CAMERA CLUB.—President, Daniel Smith. Vice-President, Frederick Ames. Treasurer, H. W. Studley. Secretary, H. W. Studley. Box 210 Rockland, Mass. Place of meeting, Smith Building, Liberty street. Date of meeting; every first and third Friday of every month.

Oregon Alpine Club, Portland, Oregon (formerly Oregon Camera Club) Photographic Department.—President, W. W. Bretherton. Viee-President, Otto Switzenberger. Secretary and Treasurer, E. Norton..

Oregon (Portland), Amateur Photographic Society of.—Organized April 8th, 1890. President, P. S. Bates. Vice-President, Hugo Goldsmith. Treasurer, E. B. Baker. Secretary, S. J. Kraemer. Place of meeting, Ainsworth Building.

Pacific Coast (Cal.) Amateur Photographic Association.—Organized Feb. 19th, 1883. President, Edmund L. Woods. Viee-President, Major W. H. Heuer, U. S. A. Treasurer, Geo. Knight White. Seerctary, Geo. Knight White, 89 Flood Building, San Francisco, Cal. Place of meeting, 605 Merchant street, San Francisco, Cal. Date of meeting, first Thursday after the first Monday of each month.

PEEKSKILL (N. Y.) CAMERA CLUB.—President, Dr. P. H. Mason. Viee-President, Charles D. Shepard. Secretary, and Treasurer, Edward F. Hill. Peekskill, N. Y. Governing Board, Asbury Barker, Wm. E. Flockton, H. B. Miller, and F. H. Southard.

Pennsylvania, Camera Club of the University of.—President, George D. Rosengarten. First Viee-President, Phil. E. Howard. Second Viee-President, Wm. Loyd. Treasurer, Jos. M. Mitcheson, 90. Secretary, Henry Delaplaine, 91. Place of meeting, College Hall. Rooms open at all hours of the day.

Philadelphia (Pa.), Photographic Society of.—President, John G. Bullock. Treasurer, Samuel M. Fox. Secretary, Robert S. Redfield, 1601 Callowhill street. Place of meeting, 1305 Arch street. Date of meeting, stated, first Wednesday evening each month. Conversational, third Wednesday evening each month.

PITTSBURG (Pa.) AMATEUR PHOTOGRAPHIC SOCIETY.—President, W. S. Bell. Treasurer, A. R. Neeb. Secretary, F. R. C. Perrin, Box 511, Pittsburg, Pa. Place of meeting, 59 Fourth avenue. Date of meeting, second Monday of each month.

PLAINFIELD (N. J.) CAMERA CLUB.—President, Oscar S. Teale. Treasurer, W. H. Lyon, Jr. Secretary, G. Harry Squires, 108 Broadway. Place of meeting, Club Rooms, 13 Park avenue. Meetings, first Monday in each month.

POSTAL PHOTOGRAPHIC CLUB.—President, Randall Spaulding. Treasurer, Dr. J. Max Mueller, Secretary, Dr. J. Max Mueller, West Chester, Pa. Circulates albums only.

Providence (R. I.) Camera Club.—Organized 1883. Incorporated 1889. President, R. Clinton Fuller. Vice-President, L. L. Anderstrom. Treasurer, Arthur B. Ladd. Recording Secretary, Charles A. Stoddard. Corresponding Secretary, J. Eliot Danson. Librarian, Wm. A. Chandler. Executive Committee, President, Secretarys, Treasurers, ex.-officio, and H. J. Reynolds, Wm. L. Coop, J. A. Miller, Jr., L. L. Anderstrom, H. H. Davison. Place of meeting, Club Rooms, 87 Weybosset St. Date of meeting, first Saturday, Tuesday after third Saturday. Annual meeting, first Saturday in March.

PUTNAM (Conn.) CAMERA CLUB.—Organized January, 1888. President, George E. Dresser. Secretary, Eric H. Johnson. Treasurer, Edward F. Whitmore. Meeting, first Friday in the month. Annual field day, first Wednesday in June.

QUEBEC (P. Q.) CAMERA CLUB.—Organized Feb. 8, 1887. President, J. George Garneau. Treasurer, James Brodie. Seeretary, Ernest Würtele, 93 St. Peter St., Quebec. Executive Committee, James Brodie. Place of meeting, Captain Imlah's Quarters, Citadel. Annual meeting, second Monday in December.

RICHMOND (Va.) CAMERA CLUB.—Organized April 1st, 1890 President, Prof. Charles H. Winston. Viee-President, R. A. Lancaster, Jr. Secretary and Treasurer, C. D. Habliston. Executive Committee, Prof. Charles H. Winston, Dr. Philip Taylor, R. M. Blankenship, R. A. Lancaster, Jr., C. D. Habliston.

Ridgewood (N. J.), The Amateur Photographers of.—Organized March, 1890. President, P. O. Terhune. Vice-President, Henry W. Hales. Treasurer, Fred Levien. Secretary, Robert B. Walton.

ROCHESTER (N. Y.), CAMERA CLUB OF.—Organized January 3d, 1889. President, G. Hanmer Croughton. First Viee-President,

Henry H. Turner. Second Vice-President, Samuel H. Lowe. Treasurer, Henry W. Matherson. Secretary, J. Louis Willard, 71 Stone street. Assistant Secretary, Guilford R. Adams, 24 Exchange street. Executive Committee, H. W. Matthews (Chairman), Edw. W. Horne, George W. Haskins, the President and Secretary ex officio. Finance Committee, A. S. Clackner (Chairman), H. H. Turner, W. J. C. Bicknell. Assistant Secretary, S. R. Adams. Place of meeting, Mansion House Block.

SCHENECTADY (N. Y.) CAMERA CLUB. President, Prof. M. L. Perkins. Vice-President, W. C. Vrooman. Treasurer, W. H. Peckham. Sccretary, W. E. Underhill. Meetings first evening in the month. Place of meeting, Myers' Arcade.

The Schuylkill (Pottsville, Pa.) Camera Club.—Organized Sept. 3d, 1889. President, George M. Bretz. Vice-President, E. F. C. Davis. Treasurer, B. F. Paterson. Secretary, Jay G. Shumway.

Selma (Ala.), Amateur Photographic Society of (recently Y. M. C. A.). Secretary and Treasurer, S. Orlando Trippe. Place of meeting, Johnson's Studio, Broad street. Date of meeting, first and third Thursdays of each month.

SOUTHERN TIER PHOTOGRAPHIC ASSOCIATION.—President, W. L. Sutton. Treasurer, J. G. Corwin. Secretary, A. B. Stebbins, Canisteo, N. Y. Place of meeting, different galleries of the members. Date of meeting, quarterly, first Monday March, June, September.

Springfield (Mass.) Camera Club.—President, N. P. Ames Carter. Treasurer, John Leshure. Secretary, John C. Remater, care of Chapin National Bank. Place of meeting, Brewer's Block, corner of Main and Sanford streets. Date of meeting, third Wednesday of every month.

Stevens' (Hoboken, N. J.) Photographic Society,—President, A. R. Whitney, Jr. Treasurer, C. B. Pearce. Secretary, E. W. Frazer, Stevens' Institute, Hoboken, N. J. Place of meeting, Stevens' Institute of Tech., Hoboken, N. J. Date of meeting, every second week in month.

St. Louis Camera Club.—President R. E. Collins. Treasurer and Secretary, W. H. Wilcox, 721 Pestalozzi street. Place of meeting, southwest corner 23d street and Lucas Place. Date of meeting, first and third Tuesdays each month.

SYRACUSE CAMERA CLUB.—Organized Oct. 22d, 1886. President, Arthur B. Yates. Vice-President, Amos Padgham. Treasurer, Charles R. Jones. Sceretary, Wallace Dickson, Box 173 Syracuse, N. Y. Place of meeting, 332 South Salina street. Date of meeting, every Friday evening at 8 o'clock.

TORONTO (Can.) AMATEUR PHOTOGRAPHIC ASSOCIATION.— President, W. Barkley McMurrich. Vice-President, F. D. Manchee. Secretary and Treasurer, E. Havelock Walsh, 219 Beverly street. Place of meeting, College of Physicians and Surgeons, Bay and Richmond streets. Date of meetings, Monday evenings. TROY (N. Y.) CAMERA CLUB.—Organized July, 1889. Chairman, J. E. Fairlee. Treasurer, Arthur Smith. Secretary, James Muir.

Union Co. (N. J.) Camera Club.—President, R. M. Fuller. Sccretary and Treasurer, J. L. Warner. Place of meeting, club headquarters, Roselle, N. J.

Washington (D. C.) Camera Club.—Organized as Argents, 1883. Reorganized March, 1887. President, S. H. Griffiths, M. D., U. S. Navy. Vice-President, Max Hausman. Treasurcr, A. S. Lothrop. Secretary, R. Dickenson Jewett. Corresponding Secretary, J. Albert Cole. Place of meeting, 1420 Pennsylvania avenue. Date of meeting, second and fourth Tuesdays, 8 P. M., October to June; second Tuesdays, July, August and September.

WATERBURY, PHOTOGRAPHIC SOCIETY OF.—Organized May, 1888. President, C. R. Pancoast. Vice-President, Edward H. Everett. Treasurer, Geo. S. Husker. Secretary, E. E. DeWitt. Executive Committee, Samuel B. Hill (Chairman), E. W. Mooring, Jr., E. E. DeWitt. Place of meetings, 63 Bank street, Room 18. Date of meetings, first and third Fridays of each inonth.

WATERTOWN (N. Y.) CAMERA CLUB. President, A. R. Wilson. Vice-President, T. E. Knowlton, E. P. O'Connor, Miss Helen Treadwell, Miss Fannie Moffatt. Treasurer, C. G. Lewis. Seeretary, Geo. I. Woolly, Mullin street.

Worcester Camera Club. Polytechnic Institute. President, L. E. Booth. Vice-President, H. H. Tracy. Treasurer, H. P. Wirls. Secretary, C. A. Davis. Keeper, A. P. Smith. Executive Committee, L. E. Booth (Chairman), J. P. Anderson, H. Sinclair, H. P. Davis, H. P. Crosby.

WILMINGTON CAMERA CLUB.—Organized. President, Christian Febiger. Vice-President, A. D. Poole. Treasurer, J. R. Moore. Secretary, John H. Danby, 712 West street. Place of meeting, no regular. Date of meeting, first Saturday evening in each month.

YONKERS (N. Y.) PHOTOGRAPHIC CLUB.—President, G. Livingston Morse. Treasurer, Robt. M. Reeves. Secretary, Robt. M. Reeves, Box 720, Yonkers, N. Y. Place of meeting, Deyo Building. Date of meeting, first Friday of each month. Annual meeting, last Friday in April.

ZANESVILLE CAMERA CLUB.—Organized March 15th, 1888. President, M. J. Harkins. Treasurer, E. C. Downard. Secretary, B. V. H. Schultz, 49 South Fifth street. Place of meeting, Rooms 1, 2, 3, 4, 14½ South Sixth street. Date of meeting, regular first Thursday of each month.



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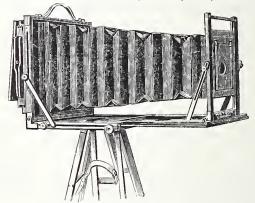
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British Journal of Photography, Jan. hth, 1889.—"It folds into a smaller compass, and is lighter and more portable, than any pattern we have yet seen; the back, by a novel arrangement, may, when required for use with a wide angle lens, he pushed forward close to the front, so that there is no protruding baseboard to interfere with the angle of the lcns. The portability of the Camera is remarkable."

Amateur Photographer, Jan. 7th, 1889.—"A wonderfully compact and fairy-like instrument, exhibiting several new and important features, which are sure to make it a favorite with Tourist Photographers."

Photography, Jan. 17th, 1889.—"One of the greatest advances in Camera construction yet reached, something really good, away ahead of anything we have yet seen."

The Camera, February 1st, 1889, in an article on the RICHMOND EXHIBITION,

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The English Mechanic, March 1st, 1889.—"For portability and compactness, combined with practical utility, this Camera may fairly be said to take the lead, and to be deserving of the title 'Acme." The dark slides are fitted with patent stops and springs, little details which help to make this Camera as near perfection as prohably can be reached."

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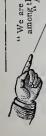
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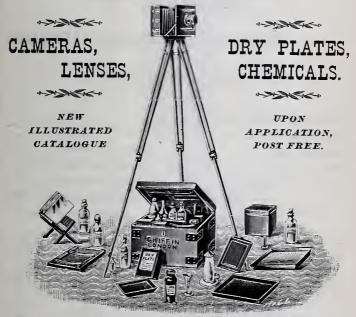
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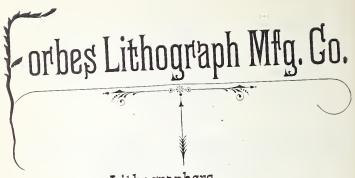


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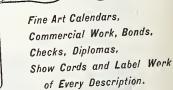


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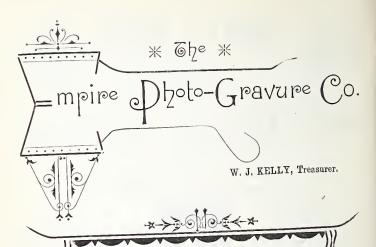


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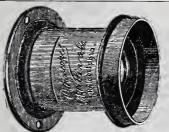
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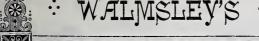
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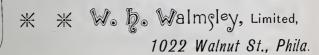
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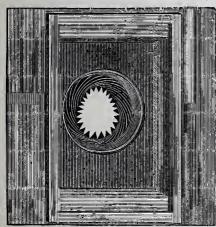


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4 in. dia., mounted, - - each, £3 13 6

Long Focus Rapid Delineator.

No.	Size of View.	Dia. of Lenses.	Equiv. Focus.	Price Rigid Setting Waterhouse's Diaphragin.
1	4 1/4 x 31/4	% ins.	6 ins.	£3 0 0
1 2 3 4 5 6 7	5 x 4	36 "	8 "	3 10 0
3	7½x 5	1¼ full	11 "	4 5 0
4	8½x 6½	11% ins.	13 "	5 5 0
5	10 x 8	13/ "	16 "	7 10 0
6	12 x10	2 "	17 "	9 10 0
7	15 x12	21/2 "	23 "	11 10 0
8	18 x16	1¾ " 2½ " 2½ " 3 "	30 "	15 10 0
8	22 x20	3% "	33 "	20 0 0
10	25 x21	4 "	37 "	23 0 0

Special Detective Lens.

Size of View.	Diameter of Lenses.		Price with Waterhouse's Stops.
4¼ x 3¼	% in.	5 ins.	£2 0 0

Rapid Delineator.

or	ize of liew Land- cape	Group or		a. of nses	Eq:	iiv. eus.	and he	ttir	ter-
5	4 x 31/4	3¼ x 3¼	5/8	in.	41/4	in.	£2	10	0
5	X 4	4¼ x 3¼ 5 x 4	1/6		6	"	3	0	0
73 83	2 X 5		11/4	full	91/2	"	3	15	0
		6½ x 4¾	11/2	ıņ.	11	"	4	10	0
10	x 8	8½ x 6½	13%	"	13	66	6	0	0
12	X10	10 x 8	2		16		7	10	0
13	X11	French Size.	21/4	44	17½	"	9	0	0
15	X12	12 x 10	21/2	44	191/2	44	10	0	0
18	X16	15 x 12	3	"	24	66	12	10	0
22	x20	18 x 16	334	"	30	"	18	18	0
25	x21	22 x 20	4	46	33	"	23	10	0

New Rapid Landscape Lens (N. A.).

For Distant Objects and Views.

No.	Largest Dimensions of Plate.	Dia. of Lenses	Equiv. Focus.	P.	rice	
1 2	6½ X 4¾ 8½ X 6½ 10 X 8	1½ in. 1¾ "	9 in. 12 " 15 "	£3	10	0
3 4 5	10 X 8 12 X 10 15 X 12	21/4 " 3 "	18 " 22 "	9	5	0
6	18 X 16 22 X 20	3½ "	25 " 30 "	12 15	5	0

Wide-Angle Delineator.

For Architectural Views in Confined Situations.

No.	Largest Dimensions of Plate.	Back Focus,	Equiv. Focus.	Price		_
						_
*IAAAA	3½ x 3½	2 in.	2½ in.	£2	Э	0
*1AAA	41/4 x 31/4	23/ "	3 "	2	15	0
*1AA	7½ x 4½	3½ "	4 "	3	3	0
1A	8½ x 6½	45% "	51/4 "	4	4	0
1	12 x 10	61/4 "	7' "	5	10	0
2 3	15 x 12	71% "	8½ "	7	10	9
3	18 x 16	11 " "	13 " "	10	10	0
4	22 x 20	14 "	15½ "	15	0	0
5	25 x 21	17 "	19 "	22	10	0
* To b	e had in pairs	for Ster	reoscopi	e Vie	ws.	

Wide-Angle Panoramic Lens.

For Landscapes Pure and Simple.

No.	Size of Plate.	Equiv. Focus.	Price.		
1A	5 x 4	5¼ in.	£2	15	0
1	7½ X 4½	7 "	3	0	0
2 3	10 X 8	10 "	4	10	ŏ
	12 X 10	12 "	5	10	ŏ
5	15 X 12	15 "	6	10	0
6	18 X 16 22 X 20	18 "	- 8	10	0
8	22 X 20 25 X 21	25 "	15	0	ő

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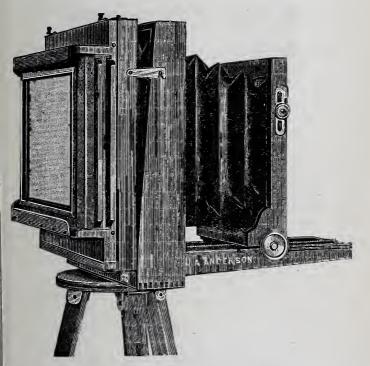
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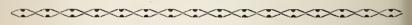
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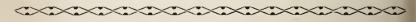


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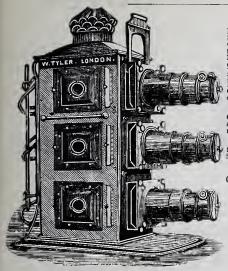
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*41/1	by 31	4	4	inch		$\frac{31/4}{1^{1/39}}$	inch	 $\frac{2}{2} \frac{5}{10}$	0		3 5	0
*5 61/2	by 4 by 5		5½ 8½	4.6		13/16	66	 3 10 4 0	0		4 5 4 15	0
8	by 5		91/2 11	44		$\frac{1^{5}}{1^{1/2}}$	4.6	 4 10	0		5 5 6 15	0
8½ 10	by 8	½	13	"		$\frac{1\frac{1}{2}}{2\frac{1}{8}}/_{16}$		 $\begin{array}{cccc} 6 & 0 \\ 8 & 0 \end{array}$	0		9 0	0
12 15	by 10 by 12		$\frac{16}{18}$	66		$2\frac{1}{2}$		 10 10 14 0	0		11 15 15 10	0
18	by 16		231/2	"	• · · ·	31/8		 4 4			r lense	s ha

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SIZE, FOCUS, PRICE,	5 x 4 6½ x 5 5 in 6½ in £1 15 £2 5	7½ x 5 8½x6½ 7½ in 9 in £2 10 £3 0	10 in £3 15	12 in £5 in £5 10
2 20		W ANGLE LANDS	CAPE LEN	pro.

PRICES OF NARROW-ANGLE LANDSCAPE LENSES.

	PRICES	OF NAI	KKOW-A	NGLE L	10 = 0	119 - 10	15 x 12	18 x 16
SIZE,	5 x 4	61/6 X 5	71% X 5	81/6×61/2 12 in	10 x 6	18 in	21 in	25 in
Focus,	7½ in £1 10							
PRICE,	1 £1 10	±1 15	City of the	ith Rotati	ng or W	aterhouse	stops.	Iris Dia-

The Landscape Lenscs are fitted with Rotating or Waterhouse stops. Iris Diapliragm 15/- extra.

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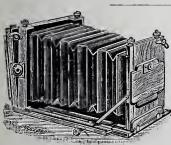
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$1\frac{1}{2}$	$9\frac{1}{2}$ 7 x 5	to $8\frac{1}{2}$ x $6\frac{1}{2}$	55/-
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1 ₁₆	10	12	<u>x</u> 10	to 14	x 11	75/-
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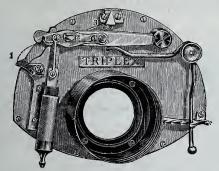
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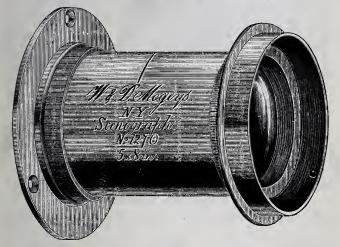
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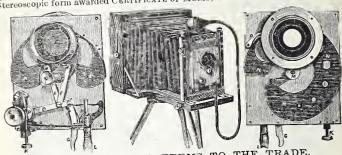
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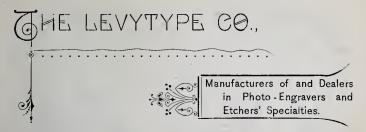
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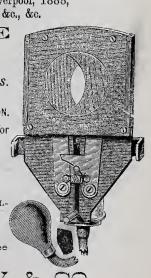
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31/4	x	41/2	4	6	14	0	8	0	per Gross.
4	x	5	6	6	20	0	. 10	3	4.6
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43/4	z	61/2	11	0	. 30	0	16	6	"
5	x	7	13	0	36	0	20	0	66
5	x	8	15	0	40	0	22	0	**
61/2	x	81/2	21	0	48	0	30	6	46
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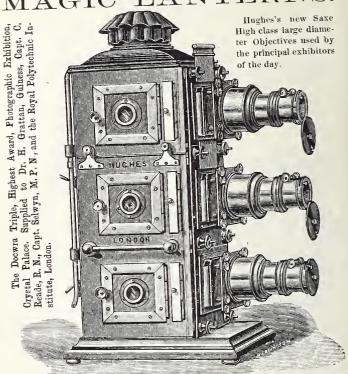
		-		-	,			
				1:	x 3	11/2	x 3	
				8.	d.	8.	d.	
Sheet .				1	9	2	6 per Gr	oss.
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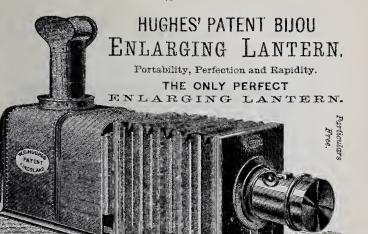
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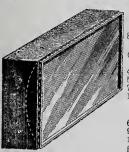
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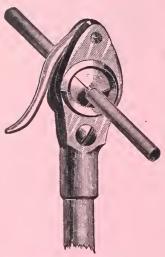
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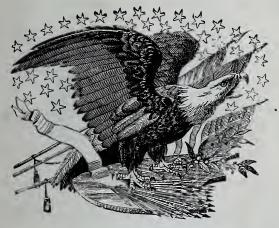
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The maker claims for this Lens a new aplanatic combination, giving greater brilliancy and illumination over a proportionately larger field than in other Aplanatic Lenses.

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Α,	4	x	5	in.	5x 7 in.	51∕2 in.
В,	5	X	7	66	8x10 "	81/2 ''
C,	6^2	x	8		10x12 "	11½ "
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Size	A	\$ 17.00	1 8	Size C \$	37.00
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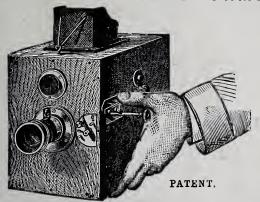
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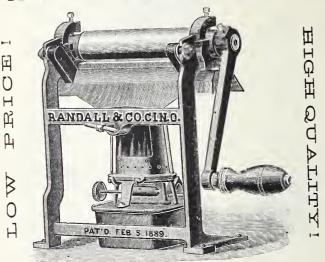
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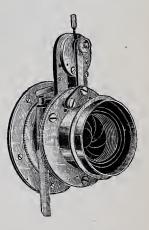
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No.	View Size.	Group Size.	Dia. of Lenses.	Back Focus.	Prices in Rigid Mounts
1 2 3 4 5 6 7 8	8½× 6½ 10 " 8 12 " 10 15 " 12 18 " 16, 22 " 18 25 " 21 28 " 24	7½× 4½ 8½° 6½ 10°° 8 12°° 10 15°° 12 18°° 16 22°° 18 25°° 20	2 ins. 21 " 24 " 31 " 4 " 5 " 6 "	8½ins 10¼ " 13½ " 16½ " 20 " 24 " 30 " 36 "	£ s 6 15 8 2 11 5 14 17 22 10 40 10 53 10 72 0

NARROW-ANGLE LANDSCAPE LENSES,

FOR MOUNTAINOUS SCENERY AND DISTANT LANDSCAPES, F12.

No.	Size of Plate.	Dia. of Lenses.	Equiv. Focus.	Price.
1 2 3 4 5 6 7 8	5 × 4 6 " 5 8½" 6½ 9 " 7 10 " 8 12 " 10 13 " 11 15 " 12 18 " 16	1 ins. 1	9 ins. 11 " 16 " 18 " 20 " 22 " 22 " 25 " 28 "	£2 19 0 3 5 0 4 10 0 4 15 0 5 19 0 6 16 0 7 19 0 9 0 0

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Ño.	Large Stop covering	Medium Stop Covering	Small Stop Covering	Equiv Focus	Price.
1 2	$\frac{3\times3}{4$ " $\frac{3}{3}$	$\frac{4\times 3}{5}$ " $\frac{4}{4}$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3 in.	£2 14 0 2 18 6
	5 " 4	71" 41	84" 5	5 "	$\frac{3}{3} \frac{3}{12} \frac{0}{0}$
3 4 5	71" 4½ 8" 5	81" 61	9 " 7	8 "	4 10 0 5 8 0
6	8½" 6½ 9" 7	10 " 8	12 " 10 13 " 11	9 "	6 60
8 9	12 " 10	13 " 11	15 " 12 18 " 16	12 " 15 "	8 20
10 11 12	13 " 11 15 " 12 18 " 16	18 " 16	22 " 18 25 " 21		10 16 (13 10

RAPID PARAGON LENSES

FOR GROUPS, VIEWS, INTERIORS AND COPYING.

Size of View.	Size of Group.	Dia. of Lenses.	Equiv. Focus.	Price in Rigid Setting.
4 × 3 5 " 4	Stereo.	å in.	4½ in.	£3 12 0 3 16 0
6 " 5 8 " 5	5 " 4 71" 41	1½ " 1½ "	7½ " 9 "	4 14 6 5 3 6
$\frac{81}{9}$ " $\frac{61}{7}$	8" 5 81" 61 91" 61	1년 '' 1절 '' 1절 ''	11 " 12 " 14 "	5 17 6 6 15 0 7 12 0
10 " 8 12 " 10 13 " 11	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	21 "	16 " 18 "	9 9 0 10 7 0
15 " 12 18 " 16	13 " 11 15 " 12	3 "	20 "	13 0 0 16 13 0 22 10 0
22 " 18 25 " 22 28 " 24	18 " 16 22 " 18 25 " 20	3½ " 4 " 4½ "	30 " 34 " 38 "	27 0 0 86 0 0

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1 2 3 4 5 6	$71 \times 41 \atop 81 \atop 61 \atop 12 \atop 12 \atop 15 \atop 18 \atop 16 \atop 18 \atop 16 \atop 18 \atop 16 \atop 18 \atop 16 \atop 17 \atop 18 \atop 18 \atop 10 \atop 10 \atop 10 \atop 10 \atop 10 \atop 10$	7 in. 11 " 11 " 12 " 2 " 3 " 34 "	3½ in. 4½ " 6¼ " 7½ " 11 " 14 " 17 "	4 in. 51 " 7 " 81 " 13 " 15½ " 19 "	£4 1 0 0 6 19 0 0 9 9 0 0 12 12 0 0 18 0 0 0 27 0 0

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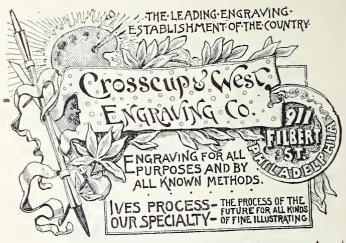
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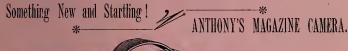
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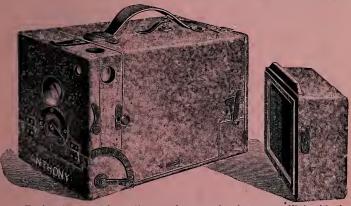
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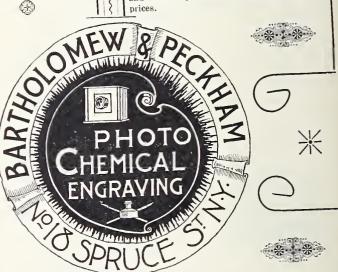
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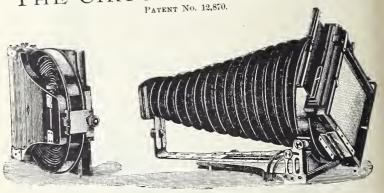
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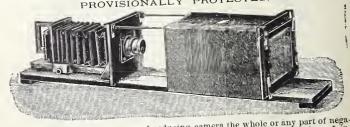
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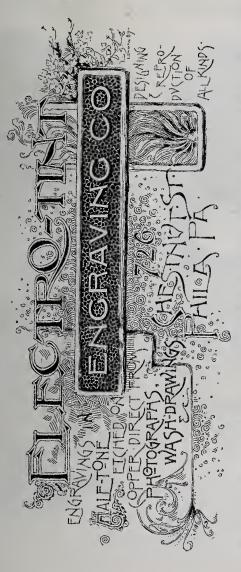


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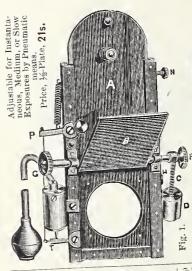
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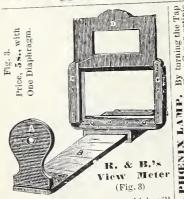


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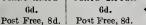
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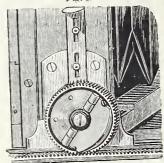
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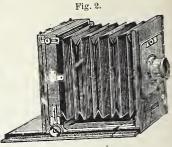
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Carrier with one Plate partly drawn.

This Back is of the solid or block pattern, with hinged shutters (four flexibles), Slide with Carrier partly drawn. a brass Carrier holding two plates (fig. 4), which is inserted in base of slide and secured by a catch (fig. 3). The danger of light penetrating through edges of back (as in book pattern) is entirely avoided, and there is also less time and trouble taken in filling. This Carrier can be easily adapted for taking films as well as plates; in size and weight it will compare favorably with any in the market plates; in size and weight it will compare favorably with any in the market.

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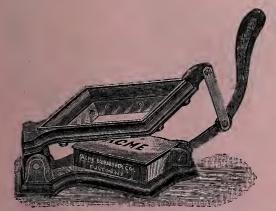
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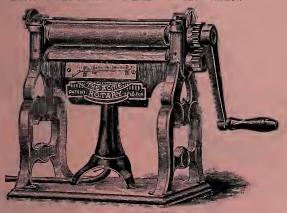
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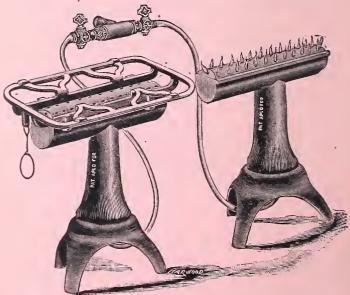
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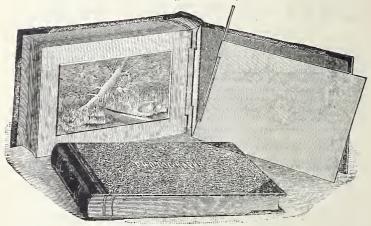
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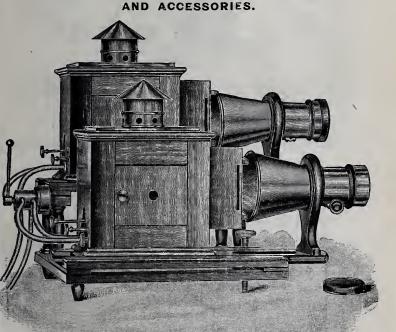
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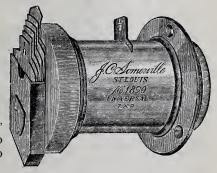
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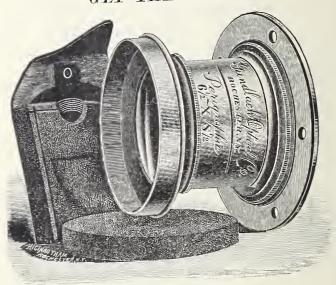
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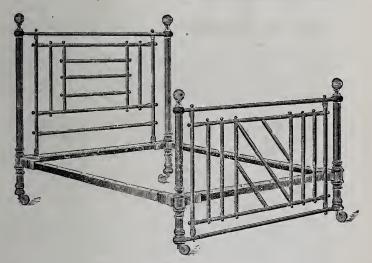
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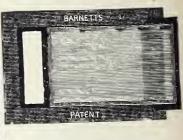
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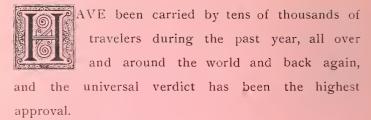
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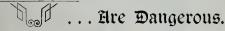
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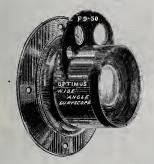
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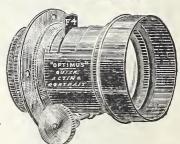
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